

Founded in 1832

RAILWAY LOCOMOTIVES
AND CARS

MAY 1957

One of Five Simmons-Boardman Railway Publications



FR-16

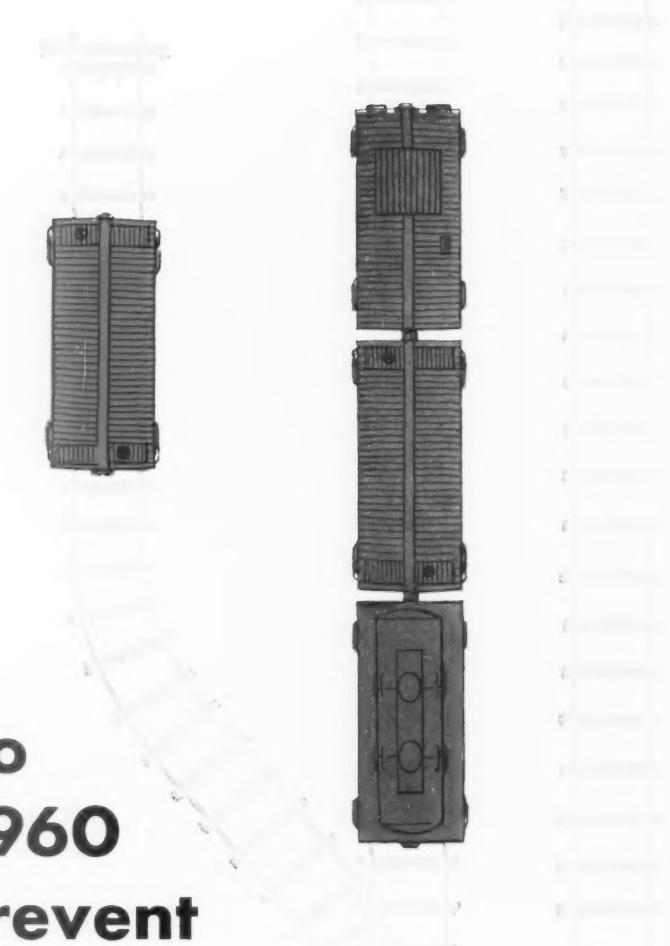
The high efficiency of the Miner FR-16 Rubber Draft Gear results from years of aggressive research procedure correlated with facts (not theories) learned from service and manufacturing experience.

We provide ample initial compression with 25% of the work accomplished at one-half travel so there will be no slack action, thereby preventing worn coupler carriers, draft keys, or vital car parts. The final pressures are low, ensuring the ultimate in lading protection.



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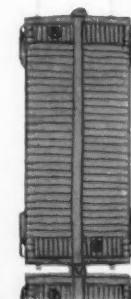
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Leading railroads stick to *Texaco Car Oil 1960* because its premium quality and low hot box record over millions of car miles have proved the preventive far more profitable than the cure.

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**TEXACO Railroad Lubricants
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**IN ALL
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USG[®] BRUSH GRADES AY 32 AND 2306

*service proved for
diesel main generators*



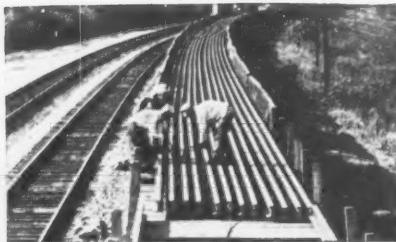
USG Brush Grades AY 32 and 2306 have proved their high performance in main generators on Diesel-electric locomotives in every type of service. Because of longer life USG Brushes actually reduce down time due to generator overhaul. Brush replacement as well as commutator wear is held to a minimum. A performance test on your equipment will prove that USG Brushes will give you superior commutation and longer service life. Only USG Brushes have Statite[®] . . . the permanent shunt connection that cannot be pulled out or jarred loose. Statite retains its original low millivolt shunt drop. Now's the time to try USG Brush Grades AY 32 and 2306 with Statite connections that have never failed in millions of miles of railroad service! Why not order today?

Send for the latest USG Brush Catalog B-56 and the new USG Brush Grade List, both are excellent for designing or for specific applications.

223

THE UNITED STATES GRAPHITE COMPANY

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ONE REASON IS WELDED RAIL. Many will miss the rhythmic "clickity-clack" of wheels on track. But by eliminating troublesome bolted rail joints, welding helps trains roll smoother and faster, with far fewer delays due to track maintenance work.



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Sundays on NBC-TV

ONE MORE BIG REASON IS HYATT HY-ROLL BEARINGS for non-stop freight. No need to delay *this* car for bearing inspection or lubrication—he can see at a glance they're dependable HYATT Hy-Rolls! That means there's a 3-year lubricant supply sealed in. It means no more hotboxes. It means husky *straight cylindrical rollers* with extra load-carrying capacity for extra reliability. That's why 38 leading lines have already adopted the HYATT Hy-Roll as a basic part of their modernization programs—to help give America even faster freight service.

Hyatt Bearings Division of General Motors Corporation, Harrison, N.J.



Another  contribution to railroad prosperity

HYATT HY-ROLL BEARINGS
FOR NON-STOP FREIGHT

PUBLISHED MONTHLY BY THE
SIMMONS-BOARDMAN

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as
the American Rail-Road Journal

MAY, 1957

VOLUME 131, No. 5

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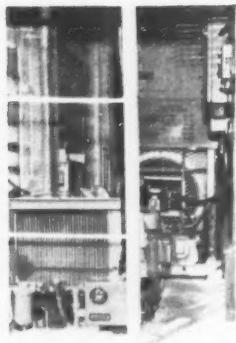
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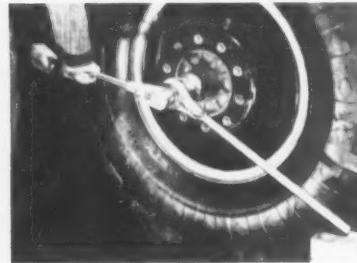
NEXT MONTH:

UP's Indoor Diesel Fueling
Insulating Varnishes Are Vital
B&O Production Car Rebuilding



Mechanical Refrigeration Unit

A compact refrigeration unit for mechanical refrigerator cars, according to the builder, features high capacity with low power requirements, automatic defrosting and heating as well as cooling, and weighs 600 lb less than previous models. Refrigerating capacity is sufficient to provide temperatures down to minus 10 deg. F under all conditions encountered within the United States. It uses a 12.5-kw Witte diesel power supply. The unit has two compressors, each capable of operating the system by itself. Both are used when high loads are imposed. All operations—alternating of compressors, heating, cooling and defrosting—are controlled by automatic devices mounted on a panel capable of withstanding severe coupling shocks. *Carrier Corporation, Dept. RA, Syracuse 1, N. Y.*



Wrench Booster

This Model TD wrench booster is a general utility tool designed to boost wrench turning force four times. Used with standard sockets and wrenches, it provides a four-to-one mechanical advantage to loosen and tighten heavy threaded parts more easily and safely.

Basically, the tool is a set of plane-

tary gears built into a simple concentric tool head. It can be completely dismantled in seconds for cleaning and lubrication and is built for torques up to 2,000 ft-lb. Models TD 750 and TD 1,000 are designed for socket-drives of $\frac{3}{4}$ in. and 1 in., respectively.

Since the torque wrench reading is multiplied by four to get the applied torque output, high-tensile steel bolts can be tightened to exact high-torque values by steady pressure, without inaccurate and dangerous impact methods. In operation, the booster joins the socket cup and the wrench, and is positioned so that the unit's reaction bar is restrained from turning in a direction opposite to the applied force. In this position the torque applied by the wrench is multiplied four times at the socket. A balanced T-wrench effect is obtained by positioning the wrench handle opposite the reaction bar. The bar applies a counteracting force that minimizes bending or breakage of the threaded part.

Muscular strain and injury from sudden breakdown at high torques is greatly reduced. The high turning power eliminates much of the damaging done by chiseling and hammering in stubborn disassembly jobs. *X-4 Corporation, Dept. RLC, Acton, Mass.*



Engine Loader Takes 3,000 Hp.

There is now available an engine loading resistor (Model 17EM89) that can test the largest diesel-electric units in railroad service today. It is capable of absorbing up to 3,000 hp and has a current capacity of 6,000 amp. Previous models have a capacity of 2,500 hp and 4,000 amp.

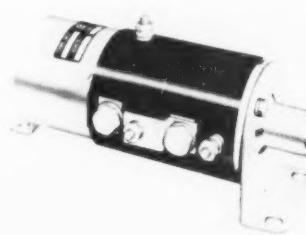
Greater simplicity and reliability of operation has been achieved by cutting the number of resistance steps from eight to three. A survey of railroads showed that most shops use only a few steps in testing engine output.

As a result of this simplification, all circuit changes are now made with a single four-pole double-throw switch, instead of the 20 switches formerly used. The use of one switch eliminates the possibility of burnouts caused by incorrect switch positioning.

Values of the resistance steps were selected to give satisfactory test points for all known engine-generator combinations. They are 0.045 ohms, 0.29 ohms and 0.42 ohms.

Mounted in a portable meter box, the meters may be placed anywhere within a 65-ft radius.

The protective shutters in the top of the resistor housing automatically open whenever the resistor is in use. *Locomotive and Car Equipment Dept., General Electric Company, Dept. RLC, Erie, Pa.*



Heavy-Duty Series-Parallel Switches

These switches, 12- and 24-volt models, are applicable to industrial, marine and railroad engines with cranking motors up to 20 hp and generating systems up to 180 amps. They are of either splashproof or waterproof construction.

A single unit series-parallel switch replaces two in the usual series-parallel system with Bendix drive. According to the manufacturer, this permits less wiring on initial installations, cuts mounting costs and minimizes possibility of line losses. Less current is required to operate the coil of one switch.

A special design prevents short circuiting from contact welding, eliminating need for fuses or circuitbreakers. *Leec-Neville Company, Dept. RLC, 1374 East 51st street, Cleveland 3.*

Waterless Hand Cleaner

The West waterless hand cleaner is a white, liquid emulsion specifically formulated to remove soil, grease, inks, paints and grime from the skin. The ingredients (Continued on page 8)

You get **BOTH** with



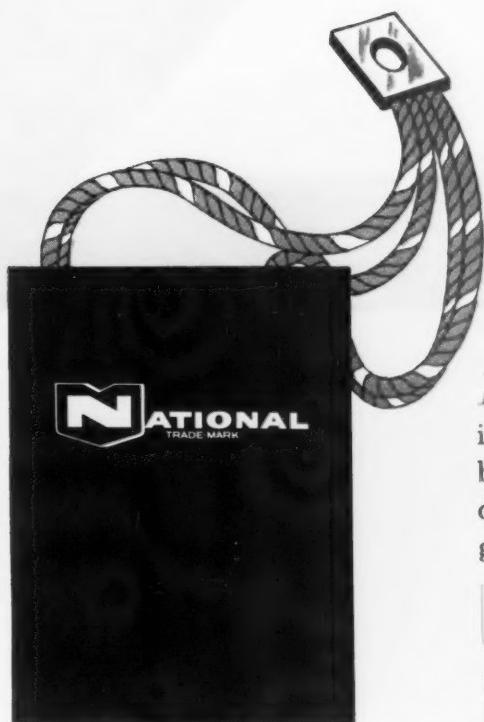
NATIONAL BRUSHES

TRADE-MARK

**EXCELLENT
COMMUTATOR
CONDITION**

**LONG
BRUSH
LIFE**

on equipment of all makes and types
—in all classes of service



Balanced performance...
is the big reason why more "National"
brushes are both approved and used on
diesel-electric traction motors and
generators than all other brands combined.



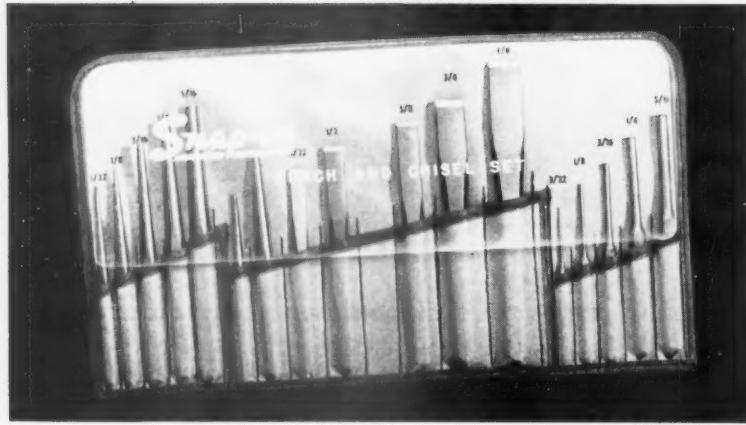
**Best for all types of equipment...
preferred for all types of service**



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NATIONAL CARBON COMPANY • A DIVISION OF UNION CARBIDE AND CARBON CORPORATION • 30 EAST 42nd STREET, NEW YORK 17, N.Y.
Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. In Canada: Union Carbide Canada Limited, Toronto

**Cut Clean, Punch True with These
New, Extra Tough...**

Snap-on CHISELS and PUNCHES



Snap-on set No. PC-170-K contains five starter punches and five drift punches 3/32 to 5/16 in.; five chisels 13/32 to 7/8 in.; and two sizes of center punches. Sizes are clearly marked on protective kit bag as illustrated.

This new *Snap-on* chisel and punch set contains the basic tools to handle a wide range of jobs. A mechanic can select the right chisel, starter punch or drift punch to get cleaner, more exact results, longer tool life.

Here is why experienced mechanics prefer *Snap-on*:

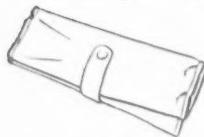
Special Steels scientifically heat-treated for long life. High silica, manganese, molybdenum steel is heat-treated under controlled atmosphere for uniform hardness. Chisel and punch heads are then induction-drawn to reduce hardness to just the right degree. The result is a controlled-mushrooming, long-life striking surface.

70-Degree chisel edge cuts better, stays sharp longer. Exhaustive tests by *Snap-on* engineers show that by shaping cutting edge to a 70-degree angle, the chisel cuts better, stays sharp longer.

New Octo-Square shape for firm, comfortable grip. *Snap-on* chisels and punches are square shaped with beveled corners to give user a better, more comfortable surface for firm control, greater safety, and prevent tool from rolling out of reach.



New-Style hold-tight kit bag. New kit bag folds easily — has a transparent flap which keeps tools from dropping out.



**Snap-on* is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
Railroad Division
8130-E 28th Avenue • Kenosha, Wisconsin



EQUIPMENT

(Continued from page 6)

are mild and odorless, and pH is almost neutral. The cleaner contains no harsh alkalis or abrasives and repeated use, it is said, will not cause a "defatting" of the skin. A relatively high amount of Lanolin is used in the cleaner and it is mildly perfumed. *West Disinfecting Company, Dept. RLC, 42-16 West Long Island City 1, N. Y.*



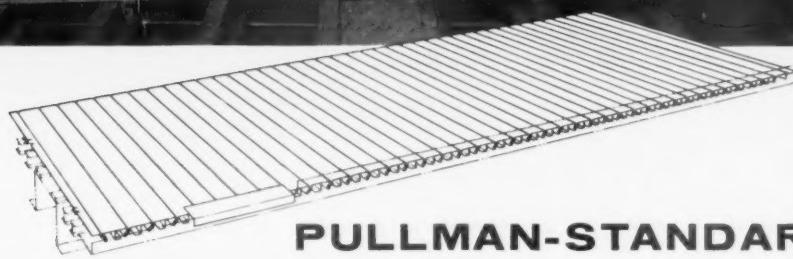
Portable Gantry

An adjustable height gantry, light enough to be erected anywhere by two men, has a maximum height of over 14 ft. The legs have 6 ft adjustment, permitting setups over high obstructions, or where headroom is low. The I-beam, of a light, strong aluminum alloy, is 10 ft long and weighs only 65 lb. Each of the removable end supports is a complete tripod and can be used as a convention tripod. *B. E. Wallace Products Company, Dept. RLC, Exton 20, Pa.*



Insulating Tape Conforms To Irregular Shapes

A new varnished polyester web tape said to have a higher dielectric strength, a lower power factor, lower moisture absorption and greater conformability. (Continued on page 16)



PULLMAN-STANDARD NAILABLE STEEL FLOOR

provides 33% more nailing space... plus exceptional nail holding power

Cost and service conscious railroads all over the Great American Railway System are replacing wood decking with long-lasting, easily installed Pullman-Standard Nailable Steel Floor. Prominent carriers have over 2500 car sets of this outstanding lading and equipment protection product now in service or on order with Pullman-Standard.

Behind these users' decisions to specify Pullman-Standard Nailable Steel Floors is the knowledge that they are built to provide exceptional durability and strength plus superior nailholding power. And floor maintenance is minimized... cars stay in service longer. Costly floor repairs and cooperage are practically eliminated.

The P-S Nailable Steel Floor design includes ample nailing space, contributing to lading security for your shippers. 99 car-width grooves in a 50'-6" box car and 79 in a 40'-6" box car means 33% more nailing space than other steel floors. Permits any conventional arrangement of car bracing, blocking or bulk-heading.

For complete details on this exceptional lading protection and car maintenance-reducing product by Pullman-Standard, write for literature or contact your nearest P-S sales office.

- P-S design provides exceptional nail holding power with any size nail from 16d to 40d.

- Steel angle supports and plank joints provide floor support every three inches... help prevent crushing and dishing by heavy lift trucks and racks.

- P-S narrower planks on 6" centers provide greater strength and more nailing grooves.

- P-S flexible nailing joint snaps back... retains original holding power even after use of 30d or 40d nails.

- 1/16" underframe clearance built into plank joints prevents offsetting... planks are always level.



WORLD'S LARGEST BUILDER OF ROLLING STOCK

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

221 N. LA SALLE STREET, CHICAGO 1, ILLINOIS
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

AAR Atomic Energy Report

Mechanical Research Report MR-280—Feasibility of Atomic Energy for Use on American Railroads, dated January 1957, is now ready for distribution.

The report covers three sections, the second section being a study made by an atomic engineer engaged for this purpose. The first and third sections represent the AAR analysis of the atomic engineer's report and also information obtained independently, but related by references to the report of the atomic engineer.

New Shops Under Way

The Chicago & North Western is spending \$4,985,665 to construct new car shop facilities at Clinton, Ia.

The Illinois Central shops at Paducah, Ky., completed in 1927 for the repair and building of steam locomotives, will be converted to handling repair and rebuilding of diesels. The IC expects complete conversion from steam to diesel power in about two years, and during this time shop conversion work will be done so as to have complete facilities available when full dieselization is accomplished.

The shops will still continue to manufacture parts used in building and repair of freight cars, and other parts used in various departments over the entire railroad.

GM Tech Tests Free-Piston Engine

The free piston engine, now out of the laboratory stage, is ready to compete on its own for power jobs, according to Arthur F. Underwood, manager of General Motors Research Staff Activities, in his speech before the Society of Automotive Engineers' New York Section on April 11. Large-size free-piston turbine combinations, he said, now have a fuel economy in the range of similar size diesels. A large test unit (1,250 gas horsepower) at the GM Technical Center has been operated by the GM Research Staff's mechanical development department with petroleum fuels ranging from gasolines to bunker C crude and shale oils.

The turbine unit, which produces the power from a free-piston gasifier, operates at maximum temperatures of 900 deg F, low enough to obviate high temperature alloys for turbine blades, such as those required for aircraft turbojet and turboprop engines. This low temperature, Mr. Underwood said, also permits engineers to use two or more identical gasifier units to pump gases into a single power turbine. "In this manner," he said, "it is possible to obtain large horsepower installations that would be quite impractical by ordi-

nary diesel engine practice. Thus, with a 1,000-hp unit, it would be possible to obtain up to 20,000 hp by paralleling 20 one-cylinder (gasifier) engines. On the other hand, to attempt to develop this horsepower by conventional diesel practice can become quite a mechanical engineering problem"

So far as the free piston engine's future is concerned, Mr. Underwood believes it will appear first where diesel power now is used, particularly small-size generating up to 400 hp. "We believe the free-piston gasifier will find definite areas where it will replace other forms of power," he told the SAE.

First National Railroad Apprenticeship Conference

The first National Railroad Apprenticeship Conference will be held in Houston, Tex., July 18-20, according to Harold M. Hoffmeister, assistant to chief mechanical officer, Missouri Pacific, and chairman of the National Railroad Conference. The meeting, to be held in conjunction with the ninth annual Southern States Apprenticeship Conference, was developed as a result of recommendations of special committees set up to study the desirability of such a conference.

(Continued on page 12)

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE APRIL ISSUE

FREIGHT-CAR ORDERS					
Road and Builder	No. of Cars	Type of Car	Cap., Tons	Other Detail	
FLORIDA EAST COAST:					
Major Car	150	Gondola	70	These orders for 255 cars subject to court order. Gondolas would be delivered first quarter of 1958; both types of hoppers fourth quarter 1957.	
ACT Industries	50	Open-top hopper	70		
Pullman-Standard	55	Covered hopper	70		
CHICAGO GREAT WESTERN:					
ACT Industries	15	Tank	—	19,000-gal. capacity	Cost, \$180,000. Delivery July or August.
GREAT NORTHERN:					
Pullman-Standard	150	Covered hopper	70	Cost, \$1,500,000. Delivery expected first quarter 1958.	
ST. LOUIS SOUTHWESTERN:					
Bethlehem Steel	50	Gondola	70	Estimated cost, \$450,250. For January delivery.	
Pullman-Standard	100	Covered hopper	70	Estimated cost, \$953,500. For October delivery.	
UNION TANK CAR CO.:					
Company shops	22	Tank	—	10,000 gal. capacity. For fourth quarter delivery.	
	2	Tank	—	8,000 gal. capacity. For fourth quarter delivery.	
WABASH:					
Bethlehem Steel	100	Gondola	70	For January delivery.	
Greenville Steel Car	50	Covered hopper	70	For June delivery.	

INQUIRIES AND NOTES

FREIGHT CARS—*Baltimore & Ohio*—Requested bids for construction of 2,000-ton, open-top, drop-bottom hopper cars. *Canadian Pacific*—Appropriated \$43,893,705 for 1957 purchase of 4,325 freight cars, and \$32,238,323 for purchase of 157 diesel locomotives units, according to N. R. Crump, CPR president, in annual report.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
January, 1953	2,828,906	2,219	4,123	6,342	446,059
January, 1954	2,583,486	3,082	3,797	6,879	375,561
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June ..	2,945,955	6,080	10,226	16,306	180,666
July ..	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,328	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March ..	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May ..	3,063,427	4,672	10,903	15,575	196,688
June ..	2,973,732	6,777	15,125	21,902	135,774
July ..	2,788,347	8,484	16,067	24,551	118,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970
October	3,113,460	4,357	8,429	12,786	243,505
November	2,953,625	2,650	5,560	8,210	359,759
December	2,933,940	2,256	4,436	6,692	438,425
1957					
January ..	2,767,060	3,373	6,121	9,494	291,453



12 Powerful New Air Grinders

★ 50% more power ★ Fewer parts ★
Weight cut down ★ Interchangeable
parts ★ Available in 4 speeds

THOR introduces the No. 4 series air grinders—12 new tools more powerful, lighter, and more foolproof than any ever offered.

What a choice! Four models with butterfly throttle, four with grip throttles, four with lever throttles.

Each of the three types is available in speeds of 4,500, 6,000, 9,000 and 12,000 r.p.m. Thor also offers a complete line of grinder accessories. Thor Power Tool Company, Prudential Plaza, Chicago 1, Illinois.

**THOR
POWER TOOL
COMPANY**

Atlanta • Birmingham • Boston • Buffalo
• Chicago • Cincinnati • Cleveland •
Denver • Detroit • Houston • Indianapolis
• Kansas City, Mo. • Los Angeles •
Milwaukee • Newark • Long Island
City, N.Y. • Philadelphia • Pittsburgh •
Richmond • St. Louis • San Francisco •
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Division, New York City



*Take your pick from the newest
most complete, most versatile
air grinder line anywhere.*



SV VERTICAL GRINDER
7 1/2 lbs. 4,500, 6,000,
8,000 r.p.m. Sanding discs
to 9" diameter, depressed
center wheels to 7 1/2", cup
or wire brushes to 6". Power
increased 50%. 4-position
throttle.



TSG DIE GRINDER
Weight only 2 lbs. yet develops 37% more power
than its predecessor. Fewer parts. 20,000 r.p.m.



3G GRINDER FOR CASTINGS
3 lbs. 11 oz. 7,000, 10,000, 15,000, 18,000 r.p.m.
available. Power increased 18%, weight decreased
16%. Wheel sizes 1 1/2" to 3".

NEWS

(Continued from page 10)

ference for the railroad industry.

Conference speakers will discuss qualifications and selections of apprentices; related instructions and the use of labor management committees; job rotation and work schedules; reducing turnover and record keeping; training in each craft, and what happens to apprentices upon completion.

Conference registration will start on Wednesday, July 17, at the Rice Hotel. Entertainment for representatives attending the Railroad Conference has been planned by the Southern States Apprenticeship Conference.

Miscellaneous Publications

"HOW TO SELECT A FIRE EXTINGUISHER." Chart lists basic types of extinguishers and shows at a glance which to use against the three classes of fire: Class A—wood, paper, rubbish, etc.; Class B—volatile liquids; Class C—electrical fires. Describes effects of temperature, operating ranges for each type of extinguisher, how various extinguishing agents kill fire, etc. *Fire Equipment Manufacturers' Association, Inc., Suite 759, 1 Gateway Center, Pittsburgh 22. Free.*

PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE. A major portion of this eleventh edition has been completely rewritten. It covers, in eight sections, all phases of arc welding—history, nomenclature and processes, weldability, mild steel procedures, manufacturing cost data, machine design, structural design, applications and reference data. *Lincoln Electric Company, Cleveland. Price, \$3.*

Personal Mention

Belt Railway of Chicago

Clearing, Ill.

H. SMALLWOOD, road foreman of engines, retired.

WALLACE A. COMBS appointed road foreman of engines.

Canadian National

E. R. LALONDE, road foreman of engines at Port Arthur, Ont., appointed master mechanic at Prince Albert, Sask.

W. O. PHILION, master mechanic at Smithers, B. C., appointed master mechanic at Edmonton, Alta.

J. P. A. MARTIN, car foreman at Senneterre, Que., appointed car foreman at Garneau, Que.

J. L. A. GAGNE, assistant car foreman at Cochrane, Alta., appointed car foreman at Cochrane, Alta., appointed car foreman at Senneterre, Que.

Chesapeake & Ohio Clifton Forge, Va.

A. M. HELMINTOLLER appointed road foreman of engines-assistant trainmaster, Allegheny Sub-Division.

E. C. MEADOR appointed road foreman of engines-assistant trainmaster, James River Sub-Division.

Ashland, Ky.

S. R. WARNICK appointed road foreman of engines-assistant trainmaster, Ashland-Russell Division.

Elgin, Joliet & Eastern

LOUIS J. VERBICH, car foreman at Gary, Ind., appointed car foreman at Joliet, Ill.

PETE J. BIANCO, JR., appointed car foreman at Gary, Ind.

Erie

STANLEY C. LUND, general foreman passenger cars, Jersey City, N. J., retired. MICHAEL J. FEDORKA, division car fore-

man, Penhorn, N. J., appointed division car foreman, freight and passenger-car departments, at Jersey City, N. J.

Gulf, Mobile & Ohio

F. W. A. REAGAN, mechanical foreman at Bogalusa, La., retired.

D. B. JOHNSON, JR., carman supervisor at Laurel, Miss., appointed mechanical foreman at Bogalusa, La.

New York Central

J. H. MACKINNON appointed assistant industrial engineer at New York.

Beech Grove, Ind.

R. L. PASSEHL appointed general foreman.

S. A. CEDERHOLM appointed process engineer.

F. E. BRITTON appointed methods and production engineer.

R. T. TOMLINSON appointed assistant general foreman.

(Continued on page 14)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

		Month of January	
		1957	1956
Item No.			
3	Road locomotive miles (000) (M-211):		
3-05	Total, steam	2,570	4,599
3-06	Total, Diesel-electric	37,026	37,084
3-07	Total, electric	714	736
3-04	Total, locomotive-miles	40,575	42,643
4	Car-miles (000,000) (M-211):		
4-03	Loaded, total	1,571	1,664
4-06	Empty, total	930	957
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):		
6-01	Total in coal-burning steam locomotive trains	6,777	10,847
6-02	Total in oil-burning steam locomotive trains	235	1,410
6-03	Total in Diesel-electric locomotive trains	104,128	104,563
6-04	Total in electric locomotive trains	2,123	2,185
6-06	Total in all trains	114,218	119,776
10	Averages per train-mile (excluding light trains) (M-211):		
10-01	Locomotive-miles (principal and helper)	1.02	1.03
10-02	Loaded freight car-miles	41.3	41.9
10-03	Empty freight car-miles	24.5	24.1
10-04	Total freight car-miles (excluding caboose)	65.8	66.0
10-05	Gross ton-miles (excluding locomotive and tender)	3,004	3,019
10-06	Net ton-miles	1,357	1,370
12	Net ton-miles per loaded car-mile (M-211):	32.8	32.7
13	Car-mile ratios—loaded freight cars (M-211):		
13-03	Per cent loaded of total freight car-miles	62.8	63.5
14	Averages per train hour (M-211):		
14-01	Train miles	18 "	18.8
14-02	Gross ton-miles (excluding locomotive and tender)	55,747	56,029
17	Car-miles per freight car day (M-240):		
17-01	Serviceable	43.9	46.0
17-02	All	42.3	44.2
18	Average net ton-miles per freight car-day (M-240)	872	917
20	Per cent of home cars of total freight cars on the line (M-240)	43.9	42.2

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):		
3-05	Steam	20,288	20,740
3-06	Diesel-electric	1,258	1,323
3-07	Electric	—	—
3-04	Total	418	1,000
4	Passenger-train car-miles (000):		
4-08	Total in all locomotive-propelled trains	222,282	235,290
4-09	Total in coal-burning steam locomotive trains	3,112	5,894
4-10	Total in oil-burning steam locomotive trains	159	2,524
4-11	Total in Diesel-electric locomotive trains	204,081	211,858
12	Total car-miles per train-mile	9.66	9.80

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:		
1-01	Steam, coal-burning	180,519	259,592
1-02	Steam, oil-burning	7,871	28,933
1-03	Diesel-electric	3,929,001	3,895,180
1-06	Total	4,120,834	4,186,805
2	Passenger yard switching hours:		
2-01	Steam, coal-burning	4,814	7,720
2-02	Steam, oil-burning	685	3,340
2-03	Diesel-electric	256,797	252,070
2-06	Total	288,068	289,614
3	Hours per yard locomotive-day:		
3-01	Steam	5.9	5.8
3-02	Diesel-electric	15.7	15.8
3-05	Serviceable	15.8	15.7
3-06	All locomotives (serviceable, unserviceable and stored)	14.6	14.1
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.81	1.74
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	80	76

* Excludes B and trailing A units.

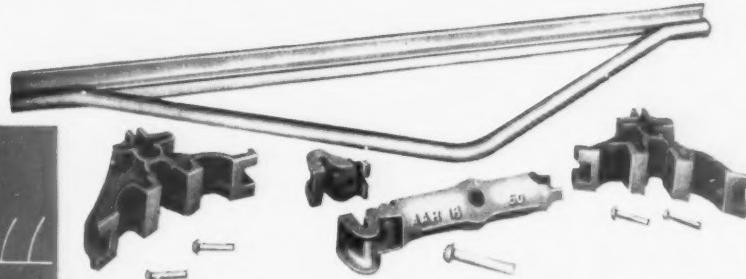
DAVIS



A RECOGNIZED
STANDARD FOR
MORE THAN 30 YEARS

Whether for Conventional Hanging or for UNIT TRUCKS Davis Solid Truss Brake Beams are DECISIVELY SUPERIOR.

SOLID TRUSS BRAKE BEAMS

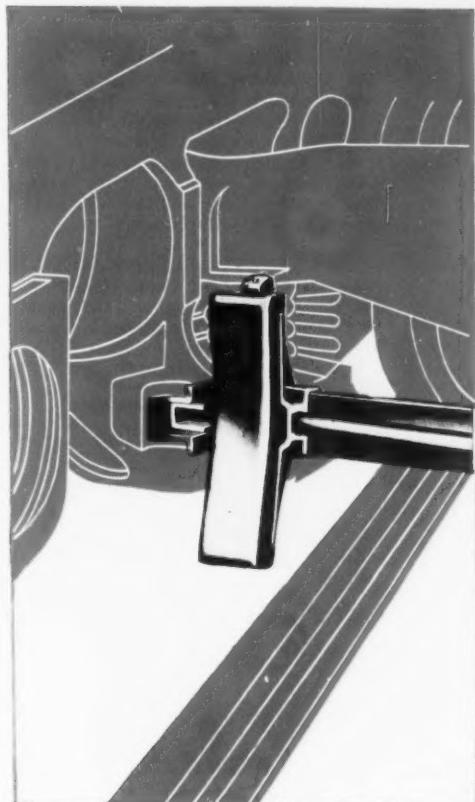


ANY PART RENEWABLE

Without Disturbing the Truss!

OTHER IMPORTANT FEATURES:

- One piece FORGED truss
- No Threaded Rods
- Interchangeable Right and Left Brake Heads Are Easily Applied without Dismantling Truss



DAVIS

BRAKE BEAM COMPANY

Plant and General Office—Johnstown, Pa.
Boston • Chicago • Cleveland
Richmond • St. Louis • San Francisco

PERSONAL MENTION . . .

(Continued from page 12)

Norfolk & Western

E. D. STRONG, general foreman at Williamson, W. Va., appointed general foreman at Bluefield, W. Va.

F. H. MCFADDEN, blacksmith shop foreman at Roanoke, Va., shops, appointed general foreman, car department.

E. E. BARTON, assistant machine shop foreman at Roanoke, Va., appointed blacksmith shop foreman.

C. C. RUTH, gang leader at Portsmouth, Ohio, shop, appointed gang foreman.

Pennsylvania

S. J. PAUL, assistant road foreman of engines, Oil City, Pa., appointed assistant trainmaster-assistant road foreman of engines, Phillipston, Pa.

H. A. McGOWAN, enginehouse foreman, Elmira, N. Y., appointed engineer-cost control (ME), Buffalo, N. Y.

T. J. PARK, enginehouse foreman, Buttonwood, Pa., appointed motive power foreman, Elmira, N. Y.

O. R. HIGHFIELD, foreman car repairs, Buttonwood, Pa., appointed motive power foreman.

O. J. DEAN appointed general foreman, Columbus, Ohio.

R. W. YOUNG, appointed foreman, enginehouse and car shop, Lancaster, Ohio.

G. R. LOWE appointed assistant foreman, machine shop, Columbus, Ohio.

WILLIAM HEIM, Jr., acting assistant

foreman, Conway, Pa., appointed foreman—electrical maintenance.

A. E. HOLT, assistant foreman, appointed foreman at Altoona, Pa.

E. E. MCINTIRE, gang foreman, appointed assistant foreman at Altoona, Pa.

St. Louis Southwestern

H. W. SEIGEL, mechanical foreman at North Little Rock, Ark., retired.

Southern

General foremen: *Alexandria, Va.: Harry B. Dunton, Jr., Atlanta, Ga.: Thomas S. Hooper, Claude O. Garvin, Prince B. Eleazer, Jr., Charlotte, N. C.; William M. Gaddy, William M. Almon, Columbia, S. C.; H. Wilbur Sanders, James C. Pope, Durham, N. C.; Robert C. Middour, Greensboro, N. C.; Samuel R. Bruce, Greenville, S. C.; Milton H. McFarland, Knoxville, Tenn.; John T. Allen, Spencer, N. C.; Samuel E. Butler, James D. DeMarcus, Jr., George L. Souther, Jr., William T. Eleazer, Charles M. Joiner.*

Obituary

HAROLD E. NIKSCH, superintendent of motive power and equipment of the Elgin, Joliet & Eastern, died recently.

C. T. WATKINS, Jr., general foreman at Roanoke, Va., shops of the Norfolk & Western, died on February 21.

FRED W. RUTTIGER, master mechanic, Morris Park shops, Richmond, Hill, L. I., died on April 11.

England district. Mr. Galvin succeeds Arthur W. Coombs, retired. E. A. Carlson succeeds Mr. Galvin as manager of railroad sales, and Paul J. McHale takes over the railroad sales duties previously handled by Mr. Carlson in the New England area.

FARR COMPANY.—Fred Richardson has been appointed Southern Division sales manager at New Orleans; Ken DeBaun, Eastern division sales manager at New York, and Andrew Gourley, Western Division sales manager at Los Angeles. Ken Baker, has been appointed sales engineer in charge of the Washington, D.C., office.

GIBBS & HILL, INC.—W. J. Madden, formerly assistant electrical engineer, Pennsylvania, has entered the service of G&H.

GOULD - NATIONAL BATTERIES, INC.—Lewis L. May, Jr., has been appointed Gulf regional manager of the Industrial Division, with headquarters at 4935 Cass St., Dallas, Texas.

JOHNS-MANVILLE CORP.—Raymond P. Townsend, vice-president and manager for transportation industry, has retired to act as a manufacturer's representative and a consultant on railroad and industrial sales problems. Mr. Townsend will be located in New York.

CRUCIBLE STEEL COMPANY OF AMERICA.—William B. Downes has been appointed manager-Stainless-Steel Sales Division, with headquarters in Pittsburgh. Mr. Downes had been assistant division manager.

DOW CORNING CORPORATION.—The Continental Diamond Fibre Corporation, Valparaiso, Ind.; Permacel Tape Corporation, New Brunswick, N. J., and the Quaker Rubber Division, H. K. Porter Company, Philadelphia, have taken over the manufacture of Silastic Type R and RG tape and cloth originally developed by Dow Corning.

EDGEWATER STEEL COMPANY.—Edgewater has opened a new office in the Fig Building, Silver Spring, Md., with R. C. Carrick, formerly service engineer in Pittsburgh, as district manager.

(Turn to page 93)

Supply Trade Notes . . .

WESTINGHOUSE AIR BRAKE COMPANY.—AIR BRAKE DIVISION.—R. A. Mitchell and C. H. Lang have been appointed representatives for the Central District, with headquarters at Wilmerding, Pa. Mr. Mitchell had been district engineer and Mr. Lang, service engineer.

TEXAS COMPANY.—The headquarters

of J. G. Wallace, assistant manager of railway sales, have been moved from New York to Chicago. Mr. Wallace will serve the Chicago, St. Louis, St. Paul, and San Francisco Divisions.

SIMPLEX WIRE & CABLE CO.—E. F. Galvin has been appointed manager and Clarence Beard, assistant manager, New



R. A. Mitchell



C. H. Lang



E. A. Carlson

No. 803
Service Plate

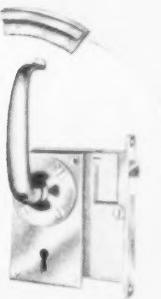


MADE FOR EACH OTHER

No. 5
Used Towel
Receptacle



No. 1437
End Door Lock



No. 1040
Coat and Hat Hook



No. 473
Luggage Rack



modern cars and
Adlake hardware...

It takes Adlake hardware to harmonize with modern car interiors. Attractive yet practical! You'll accent modern design with the Adlake line!

Note the thoughtful, functional design of Adlake's easy-to-use control plates...in the end locks that come to hand so naturally...in the lighted, continuous luggage racks...in the flush, unobtrusive coat hooks...in the good looks and efficiency of even the used towel bins...



Each Adlake item is of top quality, and economical in service for that reason. Adlake hardware for railroad cars is in one handy catalog. Write for it...

THE

Adams & Westlake

COMPANY

Established 1857

ELKHART, INDIANA, New York, Chicago

Manufacturers of Specialties and
Equipment for the Railroad Industry



NEW Utility PRESS BY

FJELLMAN AMERICAN

**for Forcing, Bending, Forming,
Drawing up to**

200 TONS

ONLY 8'7" D. x 4'5" W. x 11'3" H.

Here's a unique, compact press — ideal for custom forming where pressures up to 200 tons are required — with infinitely variable pressure-control. Its goose-neck design, 300° loading arc, high throat and long, exacting stroke make the Fjellman American utility press an extremely versatile machine for your custom production and repair department assignments.

FJELLMAN AMERICAN, INC.

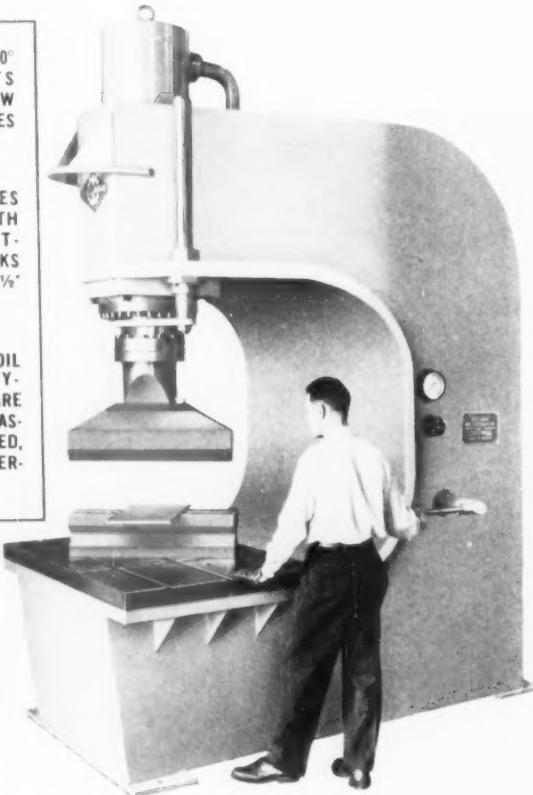
105 Republic Avenue • Joliet, Illinois

► LOADS THROUGH A 300° OPENING, PERMITS OPERATOR FULL VIEW OF WORK AND GAUGES EVERY MOMENT.

► PRESSURE REGULATES IN AN INSTANT WITH FINGERTIP ADJUSTMENT. PISTON LOCKS ANYWHERE WITHIN 27½" STROKE.

► TWO-STAGE PUMP, OIL RESERVOIR AND HYDRAULIC SYSTEM ARE HOUSED WITHIN MASSIVE FRAME. RUGGED, CLEAN, EFFICIENT OPERATION.

*Write for
complete data
and specifications*



EQUIPMENT

(Continued from page 8)

than other varnished insulations has just been announced.

Called Fibremat varnished polyester web tape, it is rated as a Class A insulation material. It is expected to be used in such applications as wrapping field coils, phase insulation in electric motors, insulating generators and transformers and for cable insulation and splicing, as well as other uses.

General properties of the tape include a dielectric strength of 1,650 volts per mil, an elongation of 20 per cent, a water absorption rate of 0.5 per cent after 24-hr immersion and a power factor of 0.02. General resistance to fresh or salt water, acid and alkalies is described as excellent by the manufacturer.

One of the most important properties attributed to the tape, is its extreme conformability in comparison with other forms of coated insulation. Due to the ease of elongation of the polyester web base, the tape can be pulled down tightly while wrapping to eliminate air pockets or voids, and make a neater appearing unit. The elongation of the tape has no marked effect upon its dielectric properties and it can be stretched with a minimum of effort to conform snugly to irregular surfaces. This ability to deform only at the point of pressure is the result of the non-continuous fiber-base. The same property improves its tear resistance.

Because of the easy workability of the tape, workers have found they can apply it faster and prefer its handling qualities. The conformability of the tape has allowed some manufacturers to increase by approximately one-third the dielectric strength of their insulation without increasing the overall dimensions of the completed electrical unit.

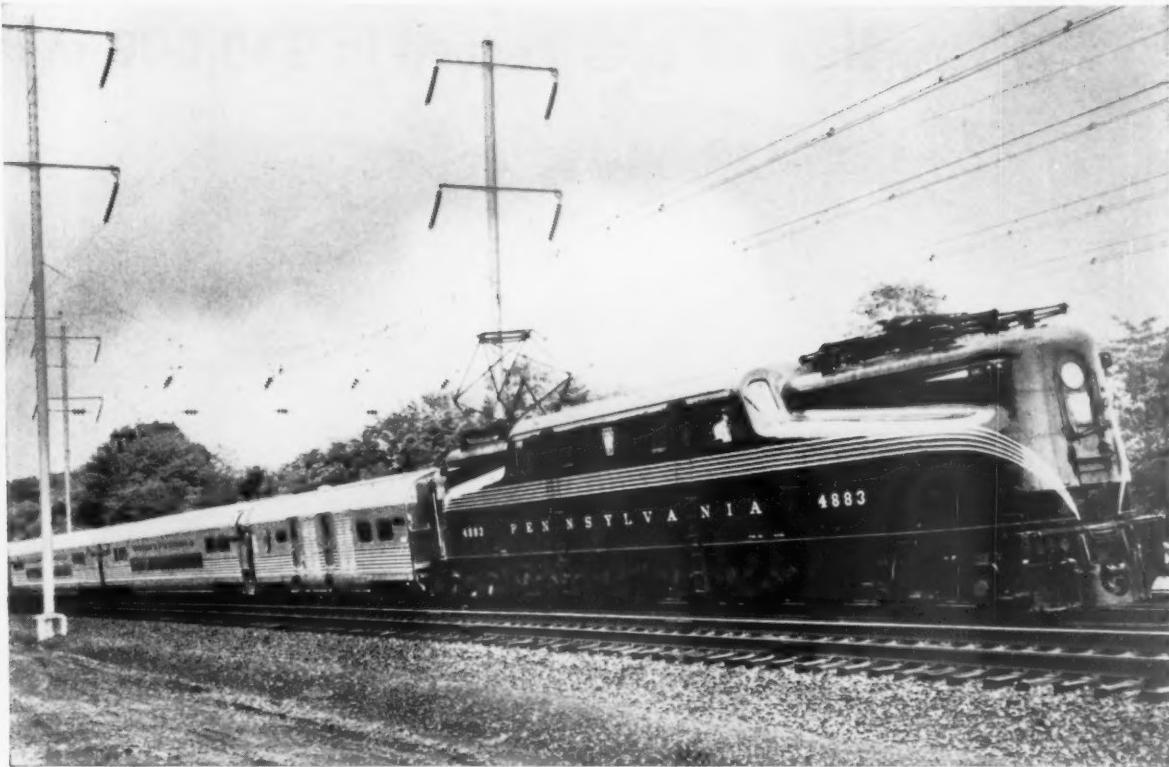
The tape differs from woven fabric tapes in that it is made up of a mat of non-woven polyester fibers in a felted form which is impregnated with a varnish coating. The tape is available in 7 and 10 mil calipers in either black or yellow varnish. Tape widths range from $\frac{3}{8}$ in. to 2 in. in 36 yd rolls. *Irvington Division, Minnesota Mining & Manufacturing Co., Dept. RLC, Irvington 11, N. J.*

Plastic to Metal Adhesive

The producers of this cement, developed specifically to bond semi-rigid vinyl to metal and other materials, say its adhesion can be broken only by tearing the vinyl itself. Applied to the metal by roller coat, spray, brush, or dip, the resulting laminate can be deep drawn, punched, cut, drilled or crimped with no reported separation of the piles.

A primer compatible with this adhesive is said to greatly improve bonds between plastics, organosols and metal.

(Continued on page 76)



"The Keystone," new Pennsylvania Railroad stainless steel tubular train features 4-wheel roller bearing trucks, lighter weight, nearly two foot lower silhouette and lower center of gravity than modern conventional cars.

Nylon Insert ELASTIC STOP[®] nuts used on new tubular train

Self-locking Elastic Stop nuts help reduce maintenance costs by eliminating the need for constant inspection and re-tightening. They contribute to safer operation because they are a one-piece unit with a self-contained locking device that holds anywhere on the bolt without depending upon washers or seating pressures. They help reduce wear on mating parts by maintaining a constant tightness in the fastened joint. That is why the Pennsylvania has used ESNA fasteners on all trucks and for hold-down of all auxiliary equipment on the new "Keystone."

What makes an Elastic Stop nut hold so positively? It's the virtually indestructible red nylon collar, impervious to oils,

grease and cleaning compounds, which grips bolt threads with a perfect fit and seals off inner bolt and nut threads against corrosion due to liquid seepage. The locking torque it creates enforces a constant metal to metal pressure on the bolt and nut thread flanks which resists the loosening effects of violent vibration and impact loads. Furthermore, the smooth locking action of the nylon collar does not gall or distort bolt threads. Both nut and bolt remain fully re-usable. For detailed information on vibration-proof fastening methods for locomotive, passenger and freight car applications, write to Railway Sales Div.—Dept. N29-523, 2330 Vauxhall Road, Union, N. J.



ELASTIC STOP NUT CORPORATION OF AMERICA



New oil sets record in 330,000-mile



GULF DIESELMOTIVE protects rated power of high-output

The pictures tell the story. Gulf's new Dieselmotive 78 keeps engines cleaner — longer. But that's not all. *This new oil enables high-output Diesels to deliver their full rated power . . . under certain conditions, it can actually increase the tonnage ratings!*

Southern Pacific put Dieselmotive 78 through a series of grueling tests in EMD 567-C units on Southern Pacific lines in Texas and Louisiana. You know the run—from hot and humid lowlands to chilly mountain

passes . . . temperatures ranging from 110 to zero degrees. Tough hauls up steep grades . . . long runs through dust, heat and cold.

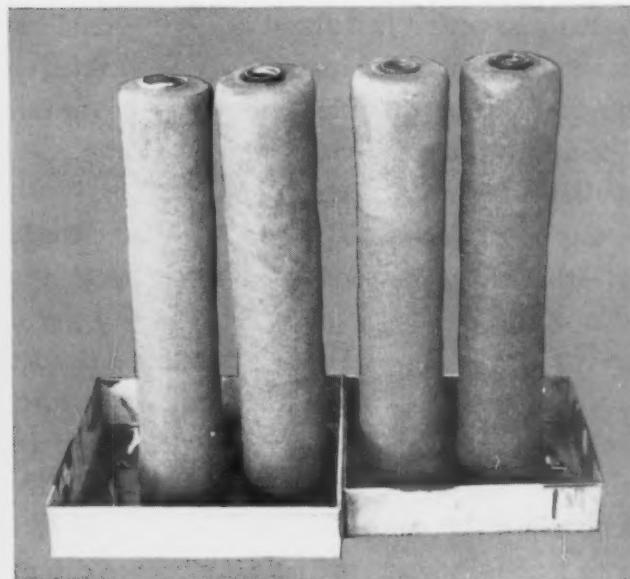
After 165,825 miles, the engines were disassembled. Rings, pistons and liners showed amazingly little wear. There were no heavy deposits or varnish anywhere. Main bearing shells were so near-new they were re-installed for further service.

You can see how engines as clean as this deliver all the power built into them. Com-

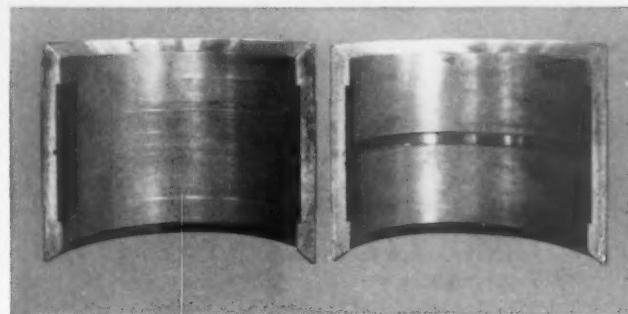
test...



After 165,825 test miles on Dieselmotive 78, pistons and liners when removed looked like this. All parts were clean, free of deposits and showed negligible wear.



Filters are free of heavy sludge. Dieselmotive 78 has about twice as much additive as ordinary Diesel engine oils. This additive reserve insures cleaner engines, less wear, than ever before.



Note clean appearance of connecting rod bearings immediately after removal from engines. Gulf Dieselmotive 78 retains its stability and lubricity even when subjected to high temperatures for extended periods.

78 OIL engines

pression is maintained, insuring continued high engine efficiency.

Gulf Dieselmotive 78 is now being demonstrated on the Missouri Pacific and Seaboard Airline Railroads. Why don't you try this new and better oil? Merely contact the Gulf engineer at your nearest Gulf office for any help you need. Or, write for more data.

GULF OIL CORPORATION

1822 Gulf Building, Pittsburgh 30, Pa.



WILL YOUR RAILROAD BE PREPARED TO GROW?

The ten-year period just ahead is a crucial one for the railroad industry. By every reasonable economic yardstick—anticipated gross national product, population growth, construction activity, steel, chemical, fuel production, etc.—this ten-year period offers undeniable opportunities for growth.

Already, we are cooperating with several roads who have measured this potential. Their conclusions are based on anticipating their equipment requirements well in advance of need. They are laying the groundwork involved through specific year-by-year order planning. Thus orders may be

placed sufficiently in advance that deliveries of power will be made when power is required, not months or years later.

On the eve of completing an expansion program that will add forty-two per cent to existing facilities at La Grange, we are in a better position than ever to help you schedule your motive requirements to match your needs. Thus, whether it be new locomotives, upgrading or conversion of present motive-power, unit exchange of components or entirely new products, Electro-Motive can help you plan today for a more rewarding tomorrow.



ELECTRO-MOTIVE DIVISION GENERAL MOTORS

LA GRANGE, ILLINOIS • HOME OF THE DIESEL LOCOMOTIVE

In Canada: General Motors Diesel, Ltd., London, Ontario

FACTORY BRANCHES

Los Angeles, Calif.
Emeryville, Calif.
Salt Lake City
Robertson, Mo.

BRANCH WAREHOUSES

La Grange, Ill.
(factory and parts center)
Halethorpe, Md.
Jacksonville, Fla.

Fort Worth, Texas
Minneapolis, Minn.

These Electro-Motive facilities can help you plan now for a more rewarding future

COMPLETE LINE OF EFFICIENT GENERAL MOTORS LOCOMOTIVES



E9 Passenger Unit



F9 Freight or Heavy-Duty Passenger Unit



GP9 General Purpose Unit



SD9 Six-Motor Road Switcher

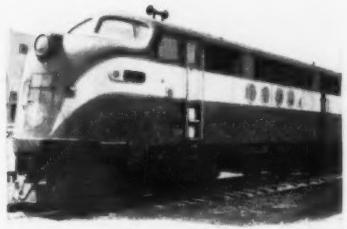


SW1200 125-Ton Switching Unit

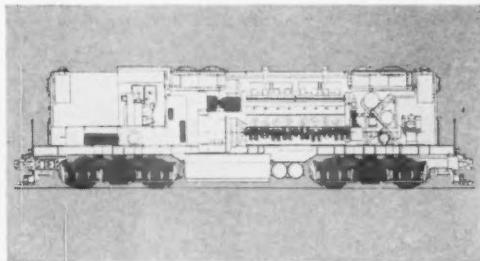


SW900 115-Ton Switching Unit

CONVERSION FACILITIES MAKE NEW LOCOMOTIVES FROM OLD



FT as it was delivered to us for converting to a modern GP9.

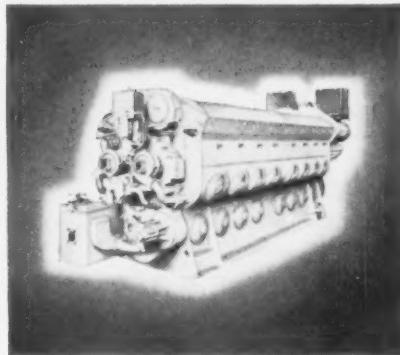
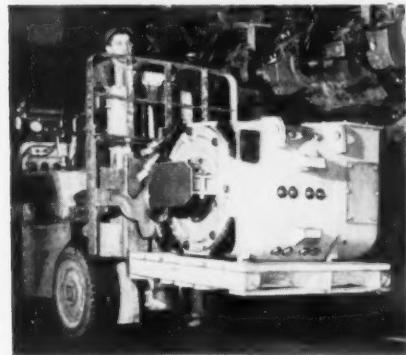


Cutaway showing parts (red) used from FT in conversion process.



Result carries a new locomotive warranty but costs considerably less than a new unit.

UNIT EXCHANGE REDUCES INVENTORY OF MAJOR COMPONENTS



This unique Electro-Motive service offers major locomotive components on an exchange basis. You don't need to hold a locomotive out of service waiting for an assembly to be rebuilt. You can get unit exchange service from any of the branches listed here to help you operate with smaller inventories and reduce maintenance costs with precision, factory-built components that contain all the latest engineering improvements.

STRATEGICALLY LOCATED BRANCHES



A network of Electro-Motive Factory Branches and Warehouses puts genuine General Motors locomotive parts within 24 hours of any point in the United States. Six of the branches, plus our facilities at La Grange, handle remanufacture of major components with the same factory facilities used in original manufacture.

**The world of science behind
EXIDE-IRONCLAD BATTERIES**



Being interviewed is E. A. Wagner, Product Engineer

"This oxide blend packs more power per ounce"

At the Exide Laboratories—

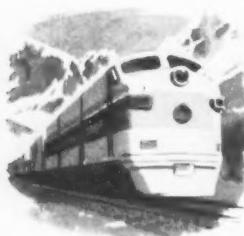
Reporter: More power, Mr. Wagner? Do you mean the blend of oxides in Exide-Ironclad is different from that used in other batteries?

Wagner: Absolutely. We can use the more active oxides that give the batteries higher capacity.

Reporter: Why do you say *can*? Can't other batteries use these oxides too?

Wagner: It isn't likely. First, this blend is the result of more than 40 years of Exide research—and it's an Exide exclusive. Second, we can use it successfully because of the unique tubular construction of the Exide-Ironclad positive plate.

Reporter: How does tubular construction help make it a better battery?



Wagner: Because the cylindrical power tubes hold the tiny oxide particles firmly in electrical contact clear through the charge and discharge cycle. So Exide-Ironclad Batteries can maintain their high capacity—even under severe vibration—for years of service.

Reporter: Obviously, this is an important feature of Exide-Ironclad Batteries.

Wagner: Yes it is, but it's just one of many engineering details that contribute to its high capacity and long life.

Note to battery users. Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Phila. 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY **Exide**[®]

Short Cut

To Low Cost Wheel Maintenance

FCC Flange Cutters

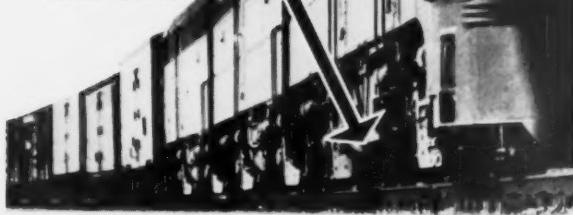
ABRASIVE BRAKE SHOES



All Popular Patterns
available from stock

WHEEL TRUING
BRAKE SHOE CO.

628 West Baltimore
Detroit 2, Mich.



AIR-PUSH Jumbo Rotary-Seal WINDSHIELD WIPERS

for over 25 years...
the "STANDARD" of the industry

POWER . . . when you need it most!

The economical Air-Push motors have the extra power needed to wipe the larger windshields used on late model locomotives.

Air-Push motors offer: INSTANT STARTING, MORE POWER, LOWER MAINTENANCE COSTS, RUGGED CONSTRUCTION, COMPLETELY REPLACEABLE PARTS . . . that's why Air-Push equipment is used on more than 90% of all diesel operated locomotives.

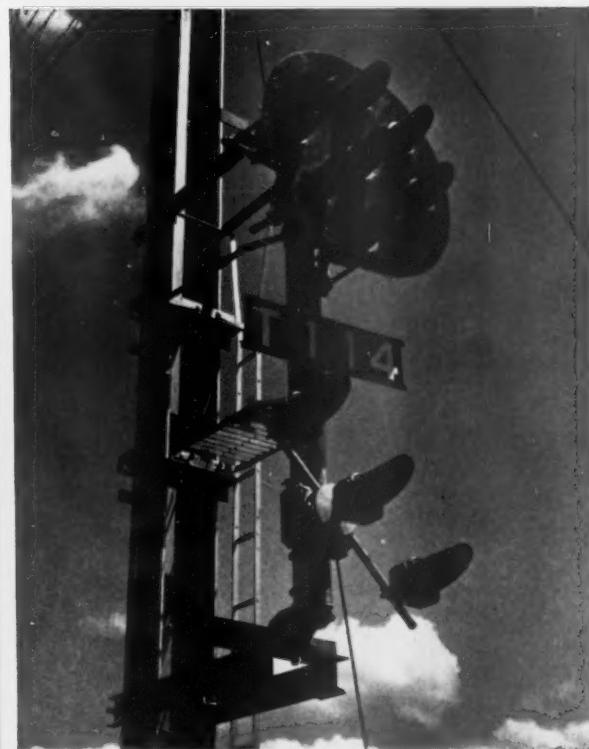
DON'T BUY A NEW MOTOR — Send your old one to the factory for a warranted major overhaul — at $\frac{1}{2}$ the cost of a new one.

Send TODAY for details!



Sprague DEVICES, INC.,
MICHIGAN CITY, INDIANA, U.S.A.

Make On-The-Job
MINOR REPAIRS
with the Air-Push
REPAIR KITS



More Ex-Cell-O pins and bushings
than any other kind
will pass this signal

Over 200 U.S. and Canadian railroads bank on
Ex-Cell-O Pins and Bushings. Why?

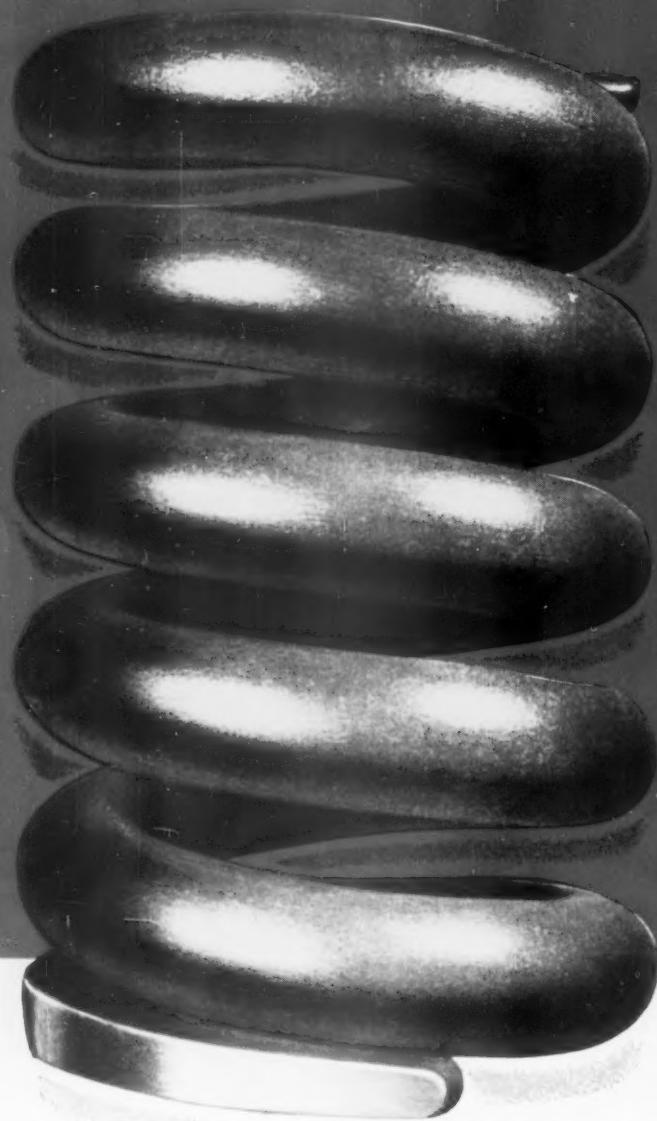
Because these bushings last longer thanks to a super-fine finish and a diamond-hard, specially heat-treated steel case. A giant stock at our warehouses assures fast delivery of any size or quantity—and every order is backed up with an extraordinary service policy. Available assembled or separately, Ex-Cell-O Pins and Bushings wear longer because they're made better.

Order directly from the convenient Ex-Cell-O Catalog
... or contact your Ex-Cell-O Representative.

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN
EX-CELL-O FOR PRECISION
XLD
RAILROAD DIVISION • DETROIT, MICHIGAN • LONDON, CANADA
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LOOK AT



1

Longer Service Life

All ASF Extended Life Springs are shot-peened—which cold-works surfaces and more than doubles the life of the spring.

ASF

ALL THREE

...before you specify truck springs!

2.

Better Performance

A new heat-treating process makes ASF Extended Life Springs far better able to maintain load-carrying capacity—without permanent set.

3.

Lower Cost

ASF Extended Life Springs are now available at no increase in cost over conventional springs. Because they last over twice as long, they cut your spring costs per car mile.

E-X-T-E-N-D-E-D L-I-F-E SPRINGS

A contribution to railroad progress...through research by

AMERICAN STEEL FOUNDRIES

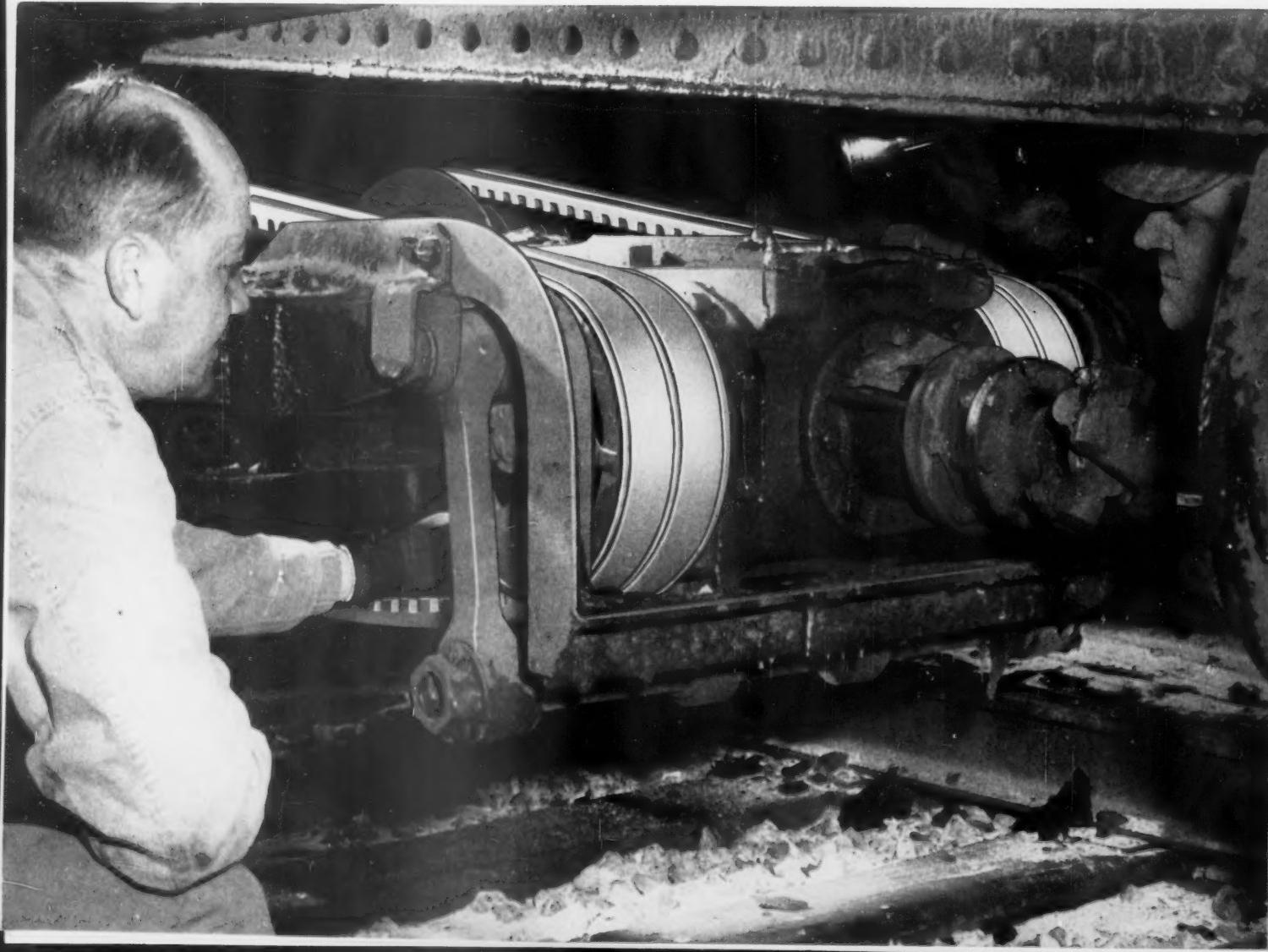
Prudential Plaza, Chicago 1, Illinois

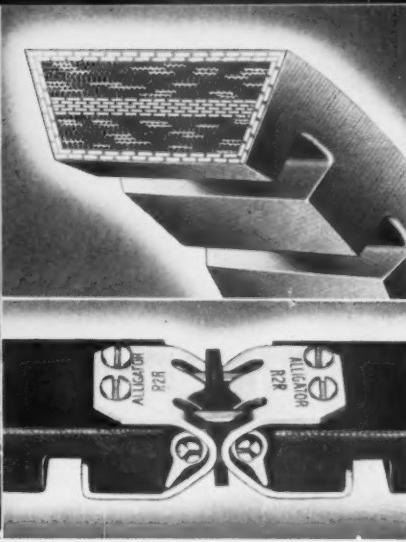
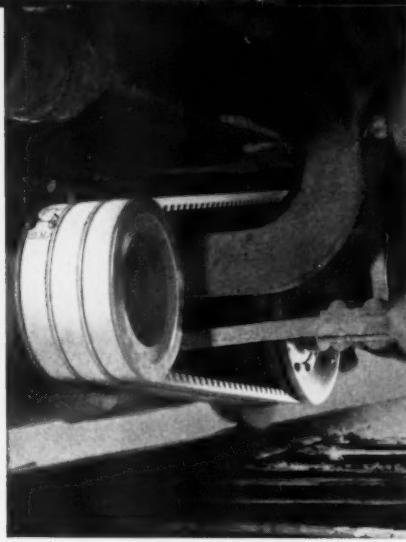
Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec



Dayton Railway 2" Cog-Belts are original equipment on Safety V-Belt Gear Box Drives manufactured by the Safety Car Heating and Lighting Company.

Dayton 2" Cog-Belts* Deliver





This belt is especially designed for use with connectors — highly resistant to pullouts. For convenience and economy the Dayton 2" Cog-Belt is available in 100 foot reels.

Steady Power Despite Oil, Dirt, Heat, Moisture

For Car Lighting, Heating and Air Conditioning Units, Dayton 2"
Cog-Belts deliver positive power under all road conditions.

Engineered and built specifically to meet the demanding requirements of railway under-car V-Drives, rugged Dayton 2" Cog-Belts deliver power dependably and economically under the most adverse weather and road conditions.

Their high resistance to extremes of temperature, moisture, oil and dirt and their low-stretch factor reduces belt maintenance to a minimum, for exceptionally low-cost operation.

The best connections you can have between axle and driven unit are Dayton 2" Cogs. They deliver positive power, yet cushion shock loads.

An experienced Dayton Railway Engineer will be happy to advise you on the application of Dayton 2" Cog-Belts to your axle V-Drives or to help you solve any railway V-Drive problem. Just write Dayton Rubber Company, Railway Division, Dayton 1, Ohio.

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*TM

Dayton Rubber

World's Largest Manufacturer of V-Belts

Specialized Railway Representatives in Atlanta, Chicago, Cleveland, Dallas, Dayton,
E. Moline, New York, Rock Island, San Francisco and St. Louis.



Railroad Cables. Helping the railroad industry overcome problems of mechanical injury, heat, moisture and chemical action has been a vital part of our business for 67 years. That's why, today, KW Railroad Cables offer you *proved dependability* for systems that must protect property and life.



Portable Cord that gives you three times longer life than the average of molded cords of other makes. It's *proved* by 12,000 tests over a 3-year period.



Portable Cable: "It's the toughest, most flexible trailing cable we've ever used in our mines," says general superintendent of coal mining company.



Control Cable, backed by 67 years of experience in electrical wire and cable manufacturing. That means dependability—*proved security* for public safety!



Service Entrance Cable, now UL-approved for 75° wet applications! Improved design characteristics include pleasing appearance and ease of application.

IF IT CARRIES CURRENT



Now! Unsurpassed benefits for the railroad industry due to Kaiser Aluminum's recent purchase of the Wire and Cable Division of U. S. Rubber, located at Bristol, Rhode Island!

Now from one source, you get all the established KW products plus all products of the new Bristol mill (formerly Wire and Cable Division of U.S. Rubber). For former U.S. Rubber products, the same quality insulations and product guarantee terms will be continued.

Now from one source, you get the most advanced technical assistance in the industry—the full cooperation of the research and development leaders of both aluminum and copper conductors.

Now from one source, better-than-ever service—from two plant locations (Newark, Ohio and Bristol, Rhode Island). This includes service from

the production, engineering, sales and distributor organizations of both Kaiser Wire and the former Wire and Cable Division of U.S. Rubber.

For immediate attention to any request for electrical conductor products, engineering and research service, or further information, contact your nearest Kaiser Aluminum sales office or the KW distributor listed in your telephone directory.

Kaiser Aluminum & Chemical Sales, Inc., Executive Office, Kaiser Building, Oakland 12, California; General Sales Office, Palmolive Building, Chicago 11, Illinois.

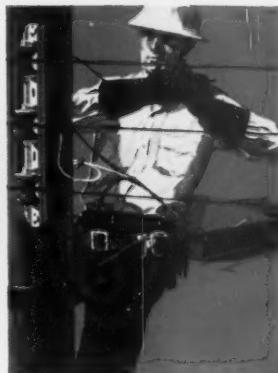
Kaiser Aluminum

the bright star of metals

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.



ACSR that can meet or exceed your toughest requirements. Put Kaiser Aluminum's growing leadership in extra high-voltage research to work for you today!



Triplex—combining three wires in one compact assembly—makes possible neater services, fewer attachments, easier installations—for big savings.



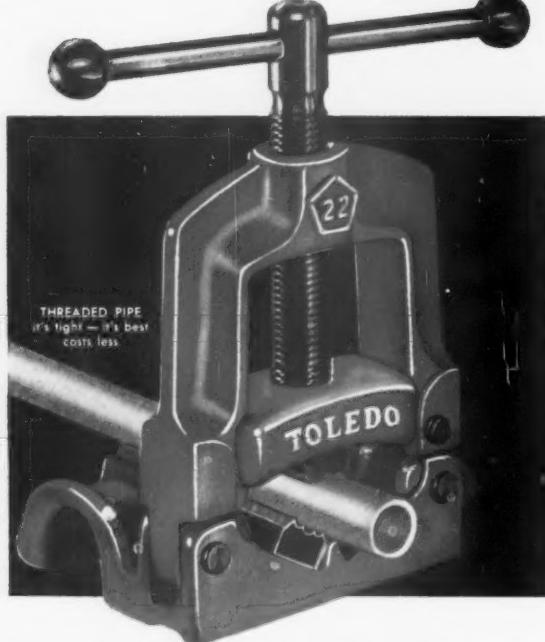
Power Cable that eliminated 26 competitive cables in time periods of from zero to 2,509 hours of a High Ozone Attack test—then went on to 6,000 hours.



Weatherproof—One of the nation's leaders in covered conductor, Kaiser Aluminum supplies the finest distribution, secondary and service cable in the field.

NEW TOLEDO No. 22 PIPE VISE

1/8" to 2 1/2" CAPACITY

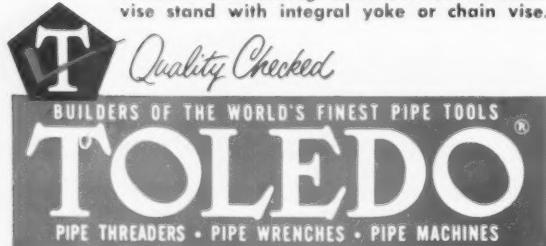


TOLEDO QUALITY COMPETITIVELY PRICED

Something new in quality, low cost pipe vises. Look at these TOLEDO Quality Checked features

- Strong, sturdy frame—but the No. 22 weighs only 12 lbs.
- Large diameter Acme vise screw threads for longer service—and they bear directly on upper jaw
- Yoke mounts quickly for right or left hand use
- Hardened steel, interchangeable jaws designed for most effective grip regardless of pipe or conduit size— $\frac{1}{8}$ " to $2\frac{1}{2}$ "
- Large bolting area—contact points evenly distributed for secure attachment of vise
- Also available soon in $\frac{1}{8}$ " to $4\frac{1}{2}$ " capacity

Send for new catalog. Watch for TOLEDO'S new vise stand with integral yoke or chain vise.



THE TOLEDO PIPE THREADING MACHINE CO., TOLEDO 4, OHIO

America's foremost engineered lettering tools

designed to reduce your present costs

50 to 80%

Used today by 1/3rd of the Nation's leading Railroads.



Spray it-
STENCILS

PRESSURE SENSITIVE TYPES



Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .



Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

For additional information write Dept. RR-100
THE DEMP-NOCK COMPANY

21423 MOUND ROAD • VAN DYKE, MICHIGAN • U.S.A.



*A Cut
Above
Average*



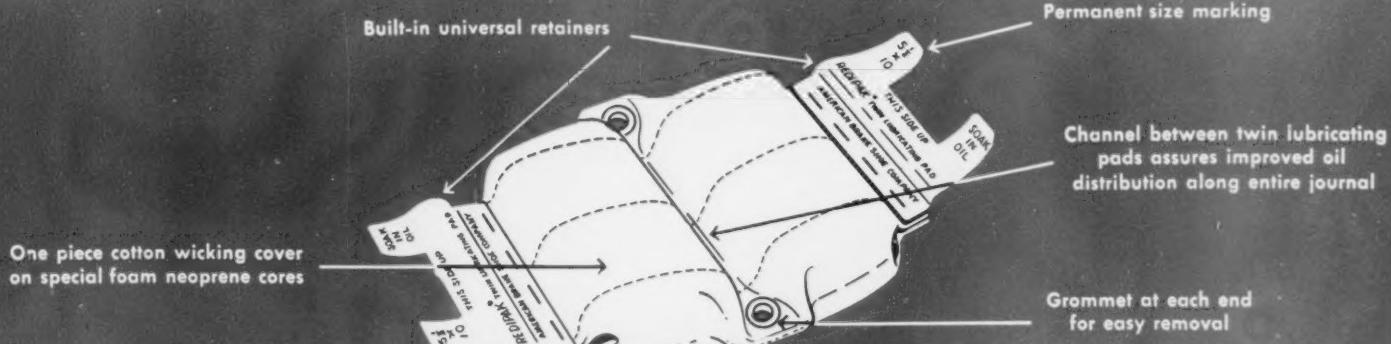
High grade small tools perfected through years of specialization.

A. Taper Bridge Reamer (Straight Flute)
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BRIDGE REAMERS
CAR REAMERS
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SPECIAL REAMERS

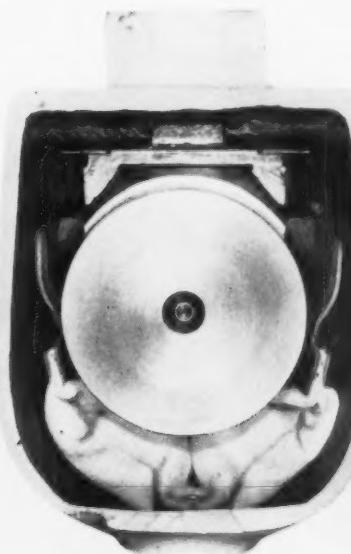
WAYNE TOOL CO.
Waynesboro, Pa.





Redipak Twin=Positive Lubrication

*Redipak® Twin lubricating pads
feature built-in universal
retainers...fit all standard
freight car journal boxes*



Service on Leading Railroads Proves that

REDIPAK® PADS REALLY LUBRICATE!

Positive Shift Prevention! Built-in fibre retainers prevent both endwise shift and shift from journal rotation. Pad resilience holds retainers against side of box, away from journal. One universal style for use in boxes with or without retaining ribs.

Far Better Wicking Action! New heavier cotton weave provides superior wicking action. Cover is woven as a single tube, eliminating all possible seams from the wicking path. The twin design also provides for equalization of the oil level in the journal box through a channel at the center.

Improved Resilience! Twin inserts are made of specially molded foam neoprene, compounded to our specifications. This provides excellent set resistance and oil absorption properties, and is designed for improved resilience.

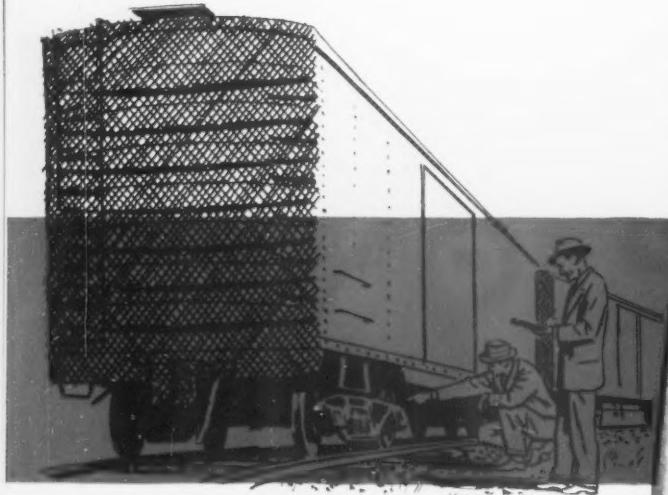
Superior Oil Distribution! New twin design assures improved oil distribution along the entire length of the journal.

See How Much Oil Redipak Pads Soak Up!

SIZE	WEIGHT	
	Dry	Saturated
4½ x 8	1 lb. 5 oz.	3 lb.
5 x 9	1 lb. 10 oz.	4 lb.
5½ x 10	1 lb. 15 oz.	5 lb.
6 x 11	2 lb. 6 oz.	6 lb.
6½ x 12	2 lb. 12 oz.	7 lb.

AMERICAN
Brake Shoe
COMPANY

RAILROAD PRODUCTS DIVISION 230 Park Avenue • New York 17, New York



**1953
to
1956**

Griffin EQS is placed in service under all types of cars and performance is so outstanding that the railroads move to adopt it as standard.



GRIFFIN EQS
ELECTRIC QUALITY STEEL

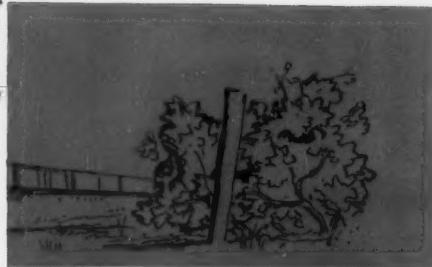
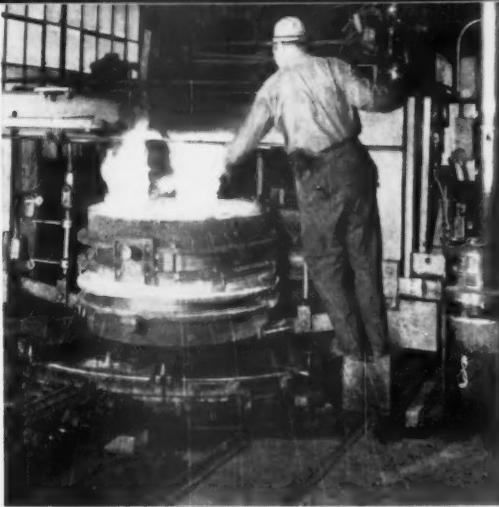


Griffin Wheel Company

445 N. Sacramento Blvd., Chicago 12

In Canada: GRIFFIN STEEL FOUNDRIES, LTD., St. Hyacinthe, Quebec

Plants strategically located to serve all railroads



1952

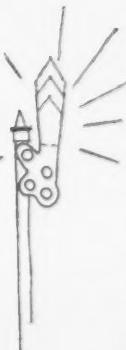
Griffin announces an entirely new concept of producing freight car wheels . . . a steel wheel, pressure-poured in precision graphite molds to fine tolerances.

1957

**Griffin EQS...now approved as
AAR STANDARD**

Effective March 1, 1957

*Give the "green" to **GRIFFIN** and watch your costs go down!*

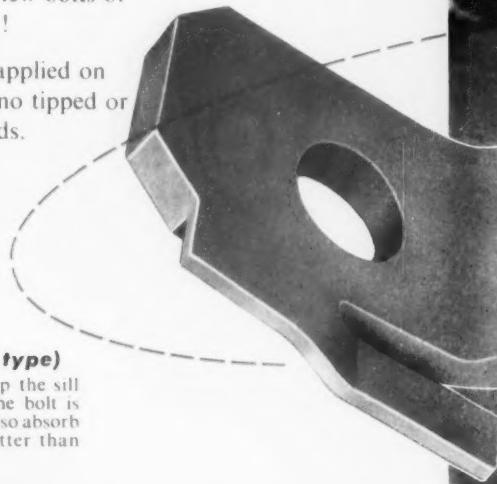


M-F

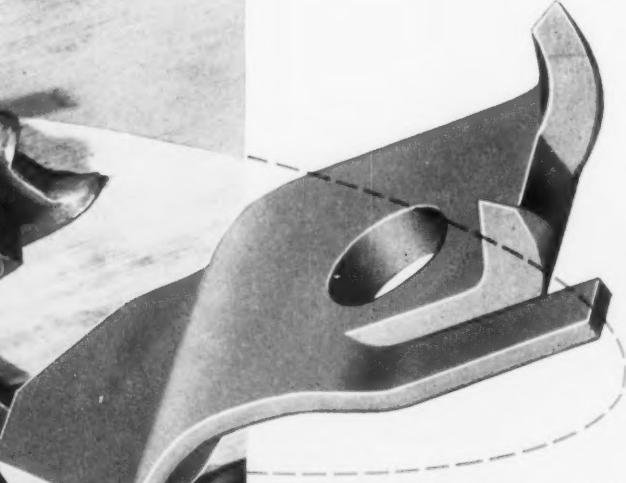
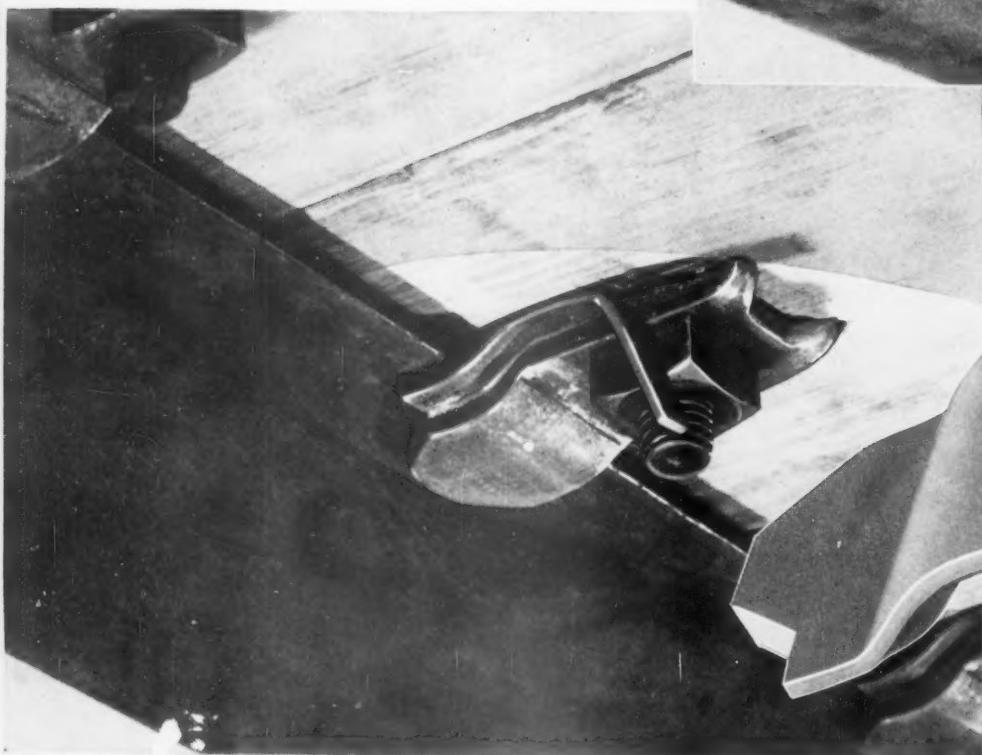
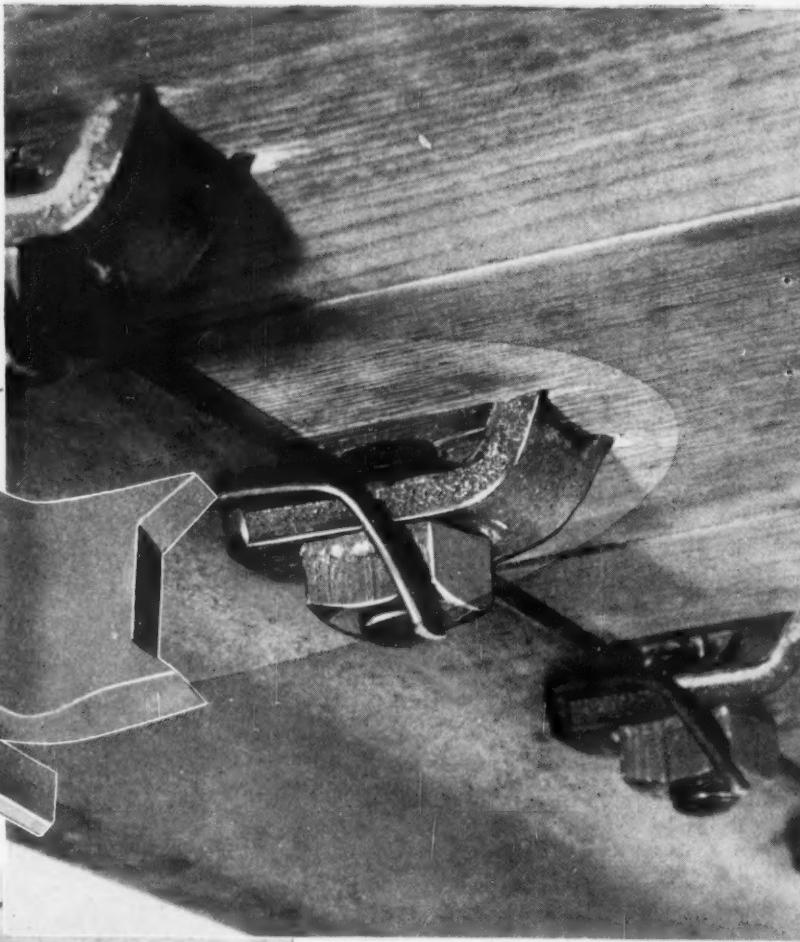
Floor Clips are the greatest single cost-saver in floor maintenance!"

M-F Floor Clips save 6 ways!

1. Drill holes from above—no template required.
2. No punching or drilling of holes in side-sill.
3. Holes farther from board-end—prevents split boards.
4. No lining up holes with side sills.
5. Shrunken floors repaired by simply jacking tight and adding new boards—no new bolts or holes needed!
6. Bolt always applied on center line—no tipped or warped boards.

**STYLE F (Bridge type)**

Style F Clip will clamp the sill more tightly because the bolt is closer to the sill. It can also absorb variation in offset better than Style G.

**STYLE G (Offset type)**

This clip has one great advantage . . . no matter what the sill condition, the floor bolts are always the same length. This advantage becomes increasingly great when the offset becomes large.

MAC LEAN-FOGG Lock Nut Company

5535 NORTH WOLCOTT AVENUE, CHICAGO 40, ILLINOIS In Canada: THE HOLDEN CO., LTD., MONTREAL

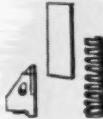
LOCK NUTS • WATERTIGHT BOLTS • SPECIAL BOLTS • FLOOR CLIPS • LADING STRAP ANCHORS • STANDARD NUTS • THE M-F UNI-TORQUE LOCK NUT

SAVINGS FACTS:



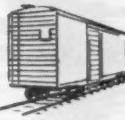
FACT No. 1

Barber Stabilized Trucks save maintenance costs. When it's necessary to service Barber parts, the friction castings and side springs are removed and replaced *5 to 10 times faster* than those of any competitive truck.



FACT No. 3

Simplicity and durability in action! Barber's three sturdy parts . . . the special *friction shoe*, the *wear plate* and the *side spring* . . . can be inspected at a quick glance. Fewest possible working parts require less attention, do a better job.



FACT No. 2

Barber Stabilized Trucks protect your equipment. Their unique system of suspension absorbs and eases . . . by friction . . . the destructive vertical shocks and bouncing as well as the lateral forces which usually result in dangerous nosing and swivelling.



FACT No. 4

Barber Stabilized Trucks save on damage claims. They provide the smoother ride for loadings. Simply stated, Barber Stabilized Trucks provide variable friction for variable loads. No over-solid spring blows! For smoother-riding freight cars, insist on Barber.



Specify Smoother-Riding

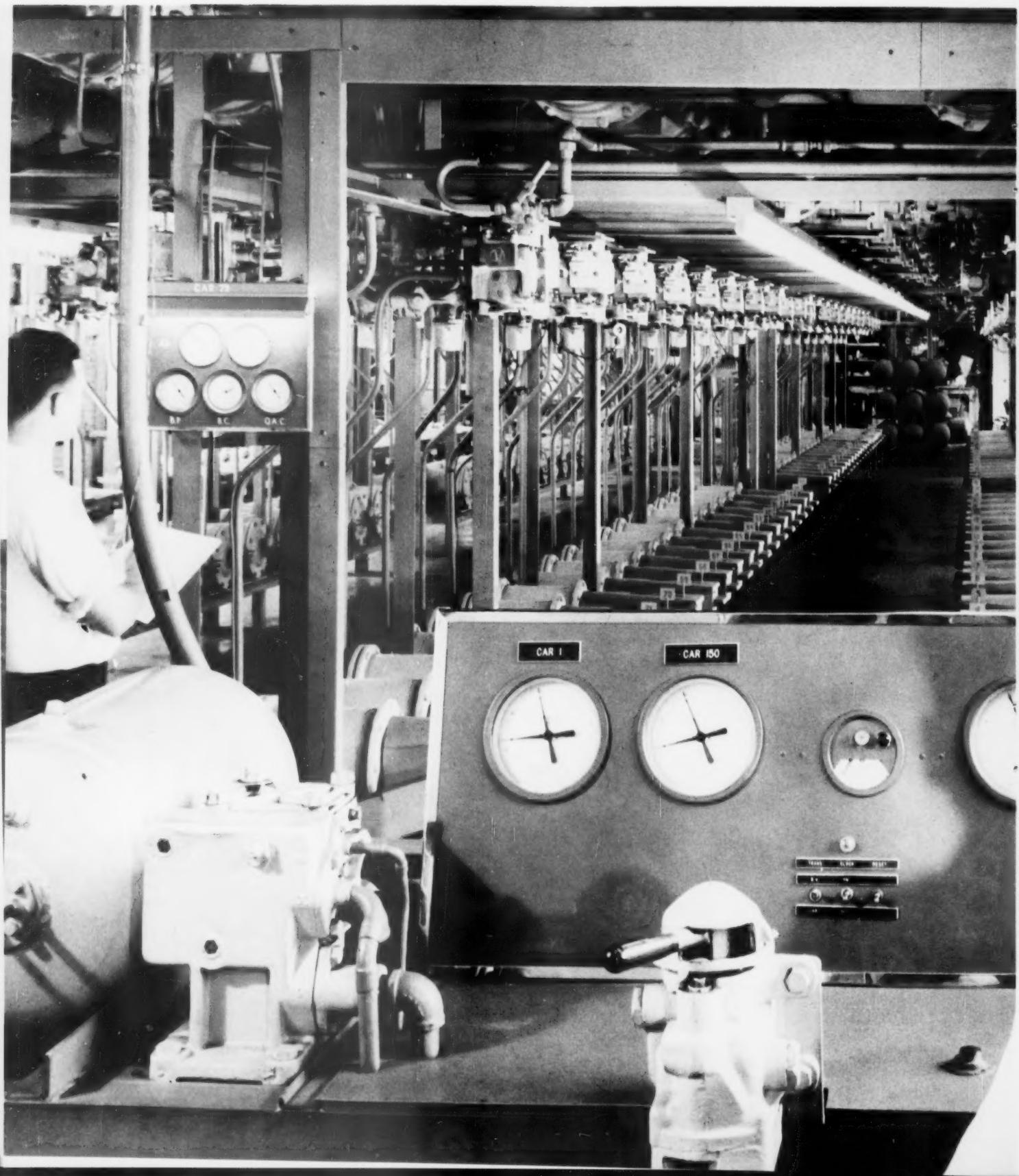
BARBER

Stabilized Trucks

Standard Car Truck Company
332 S. Michigan Ave., Chicago 4, Illinois

In Canada
Consolidated Equipment Co., Ltd., Montreal 2

This experienced railroader



taught us something



HE CAME TO WILMERDING for a few weeks last fall, fresh from railroad service, to take part in Westinghouse Air Brake Company's Clinic for Supervisory Personnel. In the process we *both* learned, from each other.

He gained a more complete knowledge of the design and operation of air brakes and other pneumatic railroad equipment. He went back to his job—perhaps on your railroad—better equipped to cope with air brake operating and maintenance problems.

We, in turn, learned from him some of the new problems that are encountered. And we were reminded of some of the old problems and their solutions. We learned more about the part air brakes play in your operations and the part we can play in improving them.

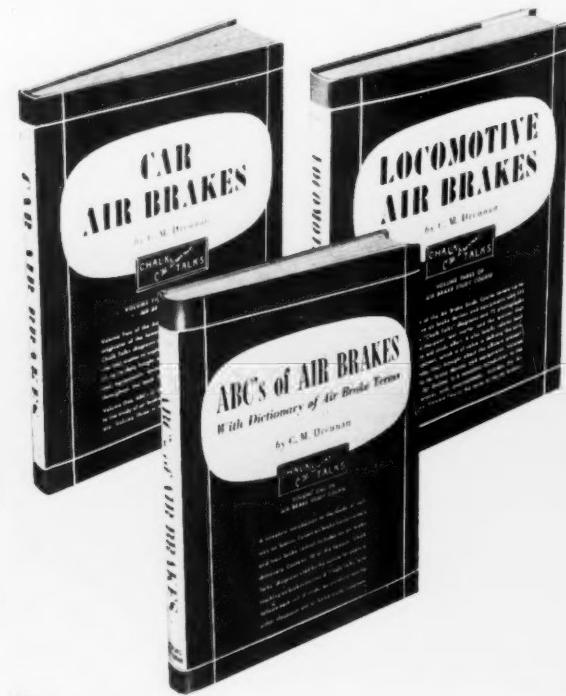
This exchange of ideas and information takes place every time a Westinghouse Air Brake man and a railroad man get together. The results are measurable in greater safety and faster scheduling through improved operation. That's why we like to get together often with railroad men.



Test Rack used in Air Brake Research

3-Vol. Complete Air Brake Course

for apprentice classes or individual study



Written by C. M. Drennan, famed air brake teacher formerly with Westinghouse, these books utilize Mr. Drennan's tested and effective "Chalk Talks" method consisting of clear, simplified "blackboard" drawings that make the function of every part easily understood. Many photographs of equipment are also included. Interspersed throughout all three volumes are quizzes for review and testing of the student's progress.

Vol. 1 (ABC's of Air Brakes) covers friction and braking ratio and freight and passenger train brake control; function and operation of pistons, valves, electric controls and other components. Dictionary of words and terms used in air brake work.

Vol. 2 (Car Air Brakes) covers all car air brake valves and other devices; freight car brakes—AB, ABLC and AC. Passenger car brakes—D-22-P; electro-pneumatic; speed-governor control; Decelostat equipment; universal control.

Vol. 3 (Locomotive Air

Brakes) is a thorough exposition of all locomotive brake equipments. Covers air compressors, relay valves and miscellaneous devices. ET equipments and modifications and 24-RL equipment; equipments with electric controls; braking force control.

SIMMONS-BOARDMAN BOOKS

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Send postage prepaid:

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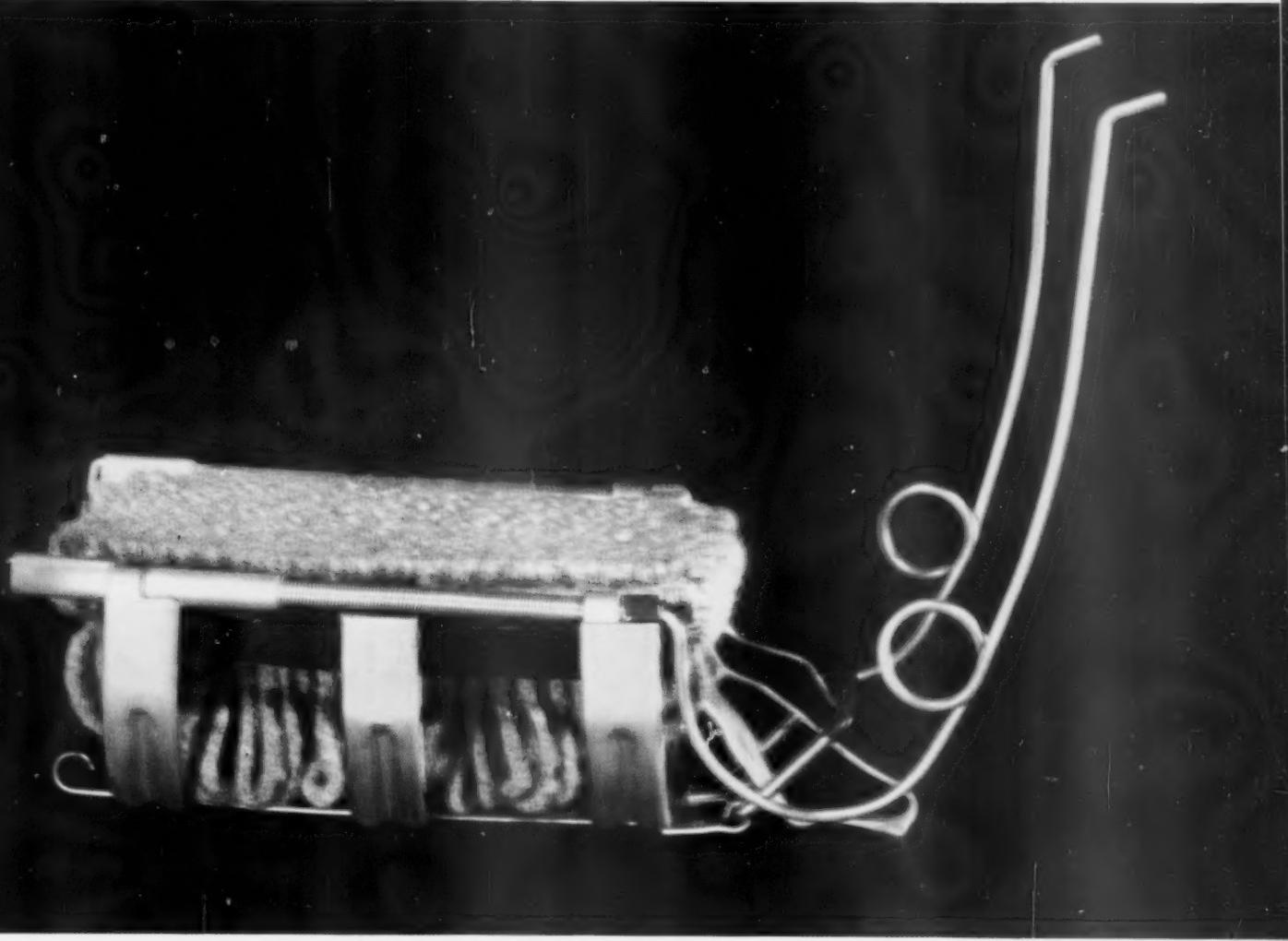
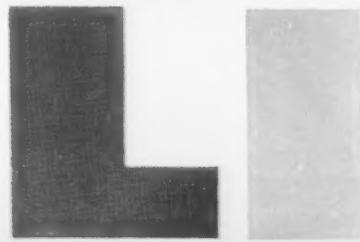
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**Full Refund in 10 Days
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THE LUBRICATING SYSTEM THAT IS CHANGING THE THINKING OF RAILROAD MEN!



PATENTS PENDING

The ROLIN transforms any journal box into a modern, non-mechanical lubricating system in minutes.

The flexible cradle frame fits the curvature of any journal box; holds the pad snugly against the journal.

Spring action holds the cradle in positive position, yet allows the pad to follow journal movements and prevents shock being transferred to the cradle. This flexible design also permits jacking of the box for easy removal of bearings without touching the lubricator.

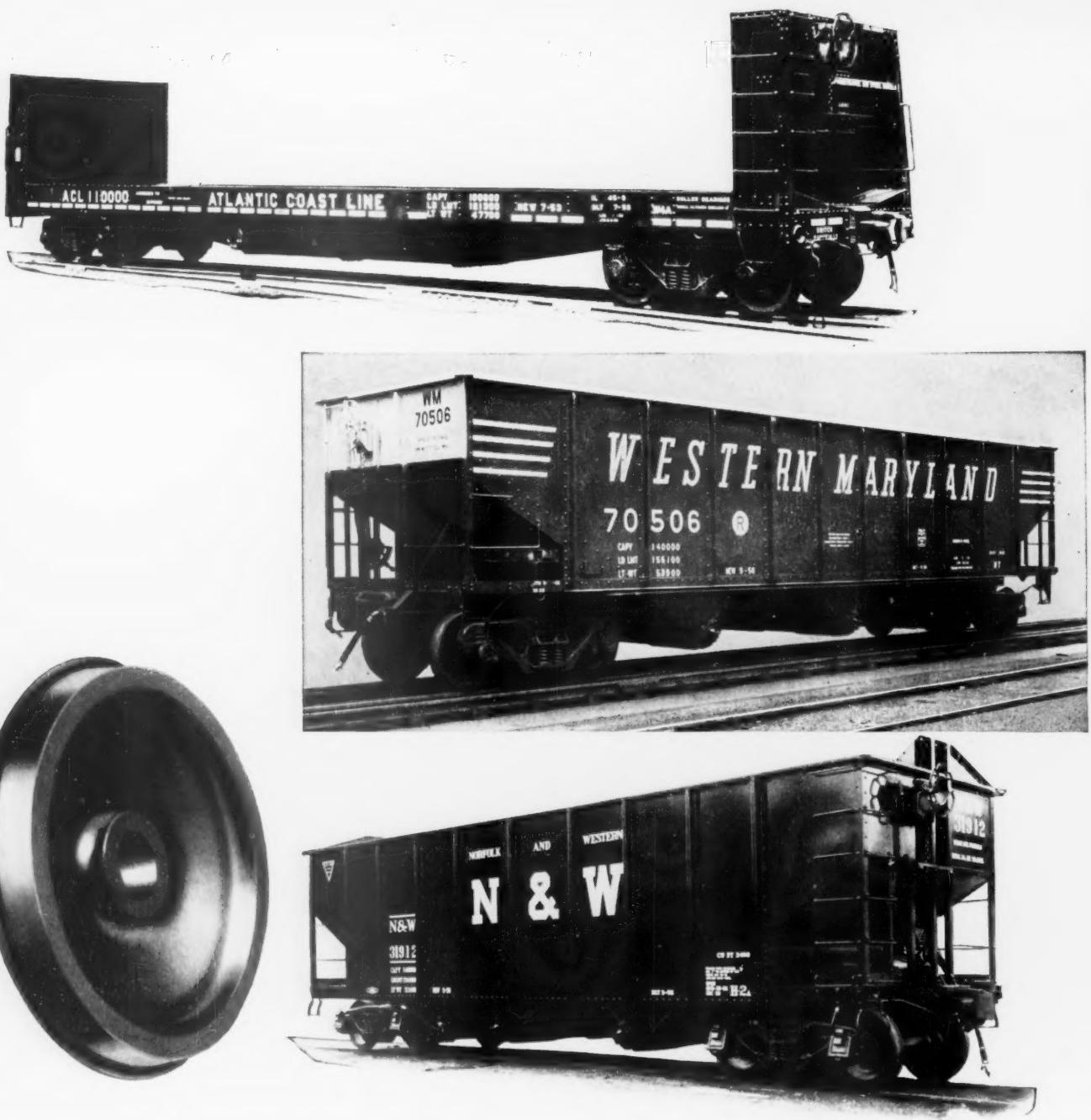
The unique cord in the pad consists of a tough thread woven around an absorbent inner lining. These endless wicks suspended below the cradle provide a rapid and continuous "pipeline" flow of oil; with a high absorption and retention capacity furnishing a tremendous additional oil reserve.

This is the ROLIN . . . designed and engineered to guarantee you freedom from waste grabs, linting, glazing, freezing, oil starvation and other causes of lubrication failures.

The ROLIN is now in general interchange service on 61 American railroads. For factual data and the truly interesting story of the development of this remarkable device, write:

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THE
rolin
CORPORATION



Three More with Multiple-Wear Wheels

Illustrated here are three modern types of Bethlehem cars that have been placed in service by prominent Eastern railroads. Each incorporates many advances in car design and construction. And each of them is equipped with multiple-wear Bethlehem wrought-steel wheels instead of the conventional one-wear type.

Of late years, the trend to the multiple-wear freight wheel has been very marked. More and more customers have been specifying multiple-wears on their Bethlehem-built cars. Today the demand is greater than ever, for excellent reasons.

Use of the multiple-wear wheel is a matter of simple economics. Because of its added thickness of rim, the multiple-wear can be turned when required and reinstalled. Thus this type of wheel is usually good for the life of the car.

We suggest you talk with us when you are next considering multiple-wear wrought-steel wheels. There are no finer ones made than those produced by Bethlehem. They are a long step in the direction of freight car economy.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributors:* Bethlehem Steel Export Corporation



BETHLEHEM WROUGHT-STEEL WHEELS

COMPANIONS TO BETHLEHEM FORGED-STEEL AXLES

FREIGHT • PASSENGER • DIESEL



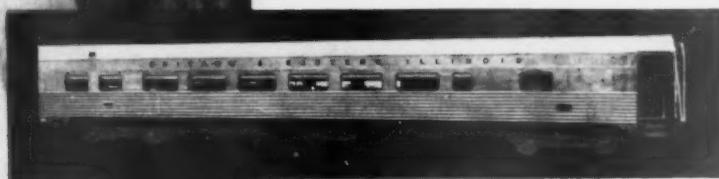
THE NEW LOOK

costs less...

HELIARC spot-welding and fusion welding are helping railroads save up to 88% of new rolling stock cost, by simplifying and speeding many car fabricating jobs . . . Now, using **HELIARC** welding, railroads can do more car work in their own shops, and realize substantial savings. Here are some important **HELIARC** welding features.

With HELIARC spot-welding, welds can be made with access to the work from only one side. All welds are clean and sound, and take only seconds to complete. No special skill is required.

HELIARC fusion welding can attain speeds of 100-in. per minute in many operations. This process makes top-quality welds in all types of joints, and in all commercially fabricated metals. It is the most efficient fabricating method for a wide variety of jobs.



Learn how **HELIARC** welding can speed production and help you save time and money . . . Contact your local **LINDE** Representative today.

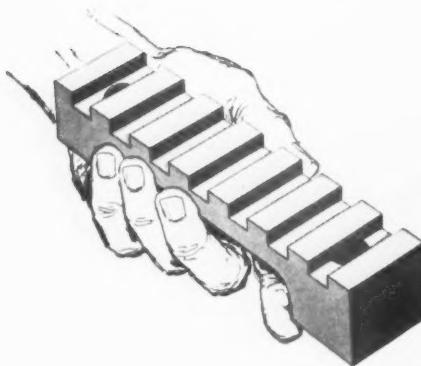
◀ A new stainless steel window frame is **HELIARC** welded in place . . . Ten additional passenger cars were remodeled at only 12% of new car cost.



Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol . . .

RAILROAD DEPARTMENT
Linde Air Products Company
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 Division of Union Carbide Canada Limited, Toronto
 "Linde", "Heliarc", and "Oxweld" are registered trade-marks of Union Carbide.

Improve the efficiency of any journal lubricator with Magnus R-S JOURNAL STOPS



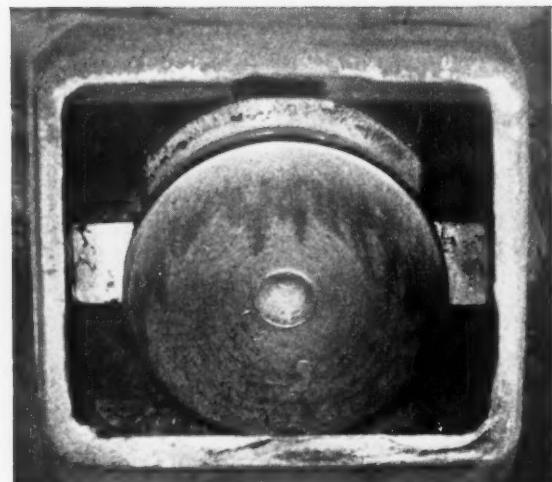
Longer bearing life and lower maintenance costs for trucks and journal boxes also yield big return on initial R-S Journal Stop investment

WITH conventional waste packing and Magnus R-S Journal Stops, you can run freight cars for *three years* between periodic servicing. That's been established by test experience to date.

Bolted to both sides of the journal box, the bronze bearing-metal Journal Stops form a permanent, built-in waste "container" that holds the mass of packing right where it belongs, even under severe braking and impact forces. And, unlike any other waste container or retainer, by keeping the bearing on the journal, you prevent short strands from being trapped beneath the bearing crown. By restricting fore-and-aft movement of the journal within the box, they prevent squashed-down waste packs, maintain constant journal-to-packing pressures, assure a uniform feed of oil to the bearing and eliminate danger of waste grabs.

But that's not all. You also get longer bearing life and freedom from spread linings. You reduce the requirements for an effective box rear seal and increase the efficiency and service life of present dust guards and seals. That's vital to the successful operation of most waste substitutes.

Pad and mechanical lubricators benefit too. By keeping



Here's proof of Journal Stops' unique ability to hold packing in place even under extreme service conditions. This unretouched photograph shows the interior of a Journal-Stop-equipped box after undergoing an 11½ mph flat-switching impact test. Waste is still firmly seated under the journal.

the journal in its proper position, you keep the box from rising during impacts and braking — don't crush the lubricator or seal. Axle dust guard seats can't be scored either.

WHAT ABOUT COST? One private car line estimates it has recovered more than 90% of the total cost of Stops and installation in just the first 20 months of operation. Other roads report comparable savings. R-S Journal Stops not only pay for themselves in reduced maintenance costs. They get cars to destination with trouble-free journal boxes. Write for complete information. Magnus Metal Corporation, 111 Broadway, New York 6 or 80 E. Jackson Blvd., Chicago 4.

MAGNUS
Solid Bearings

MAGNUS METAL CORPORATION

Subsidiary of NATIONAL LEAD COMPANY





Simplified main line map shows mileages from Meadville. A division point and almost a mid-point of the system. Meadville now has a wheel shop. Under construction is a new freight car repair shop.



Erie Is Centralizing All Wheel Production

New machinery and materials-handling equipment are vital to the well-organized, high-capacity system wheel shop.

While the Erie Railroad began its centralized car wheel production at Meadville, Pa., ten years ago, today's shop has changed greatly from the facility that went into operation in 1947. The Erie was a pioneer in consolidation of wheel shop facilities, and from the beginning equipped the shop for a high degree of semi-automatic production. Even with all this, the Erie has poured well over a quarter-million dollars into the Meadville shop in the past five years. This was a shop that already could have been cited for the completeness of its facilities and its production rate.

A Sellers dual end-drive journal lathe installed in 1954 permitted elimination of eleven lathes all along the Erie from Hammond, Ind., to Jersey City. Many of these were general-purpose engine lathes, but most had been retained only for journal refinishing. The Sellers profiling contour tread-truing lathe installed in 1955 released three older tread lathes at system car shops. The only tread lathes now operated on the Erie—other than at Meadville—are machines used for emergency work

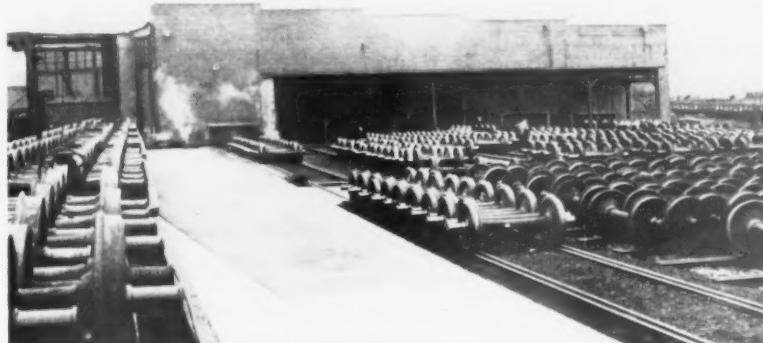
at the locomotive shops at Hornell, N. Y., and Marion, Ohio.

It was in 1947 that the Erie transferred its car wheel production from Hornell to Meadville. The wheel shop was set up in a section of the old roundhouse, and was designed to produce 65 new wheel sets per 8-hr day. To accomplish this, intensive use was made of automatic conveyors and remotely-controlled

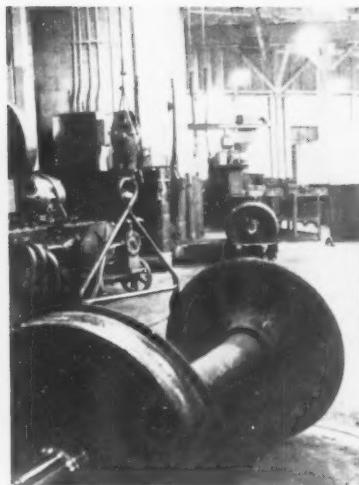
devices for the handling of both wheels and axles.

Continuing Improvements

Since then the Erie has pursued a systematic machinery replacement program, and has improved its materials-handling facilities. This shop has produced 2,600 reconditioned wheel sets in a single month. It has



Meadville shop does all Erie's car wheel work—turning of journals, turning of treads, and production of new mounted pairs both for freight and passenger cars.



Stripping press (left) and wheel elevator (center) remove and dispose of scrap wheels. Axles then go on for inspection and reuse if suitable.



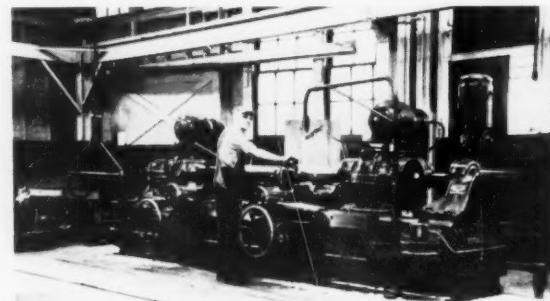
Axle cleaner was built from Wheebalator flue cleaner and uses metal pellets to prepare the axle surfaces for Magnaglo inspection.



Magnaglo inspection (left) is followed by classification at entrance to storage rack. Sorting can be by size or to set out the rejects.



Axle lathes (left) have individual storage racks and jib cranes with electric hoists to handle the axles at racks and in and out of the machines for turning.



Newest axle lathe is a Sellers end-drive machine which can swing mounted wheels and can serve as a standby for the new high-production journal lathe.

turned 100 cut journals in a single day. There is the capacity to bore and mount 90 pairs of new wheels in one 8-hr shift; but this production rate would require round-the-clock operation of all three axle lathes because each can turn out only about ten axles per shift.

The new Sellers profiling lathe has been averaging 13 wheel sets each working day (8 hrs), but has done 15 when the occasion demanded. This has been accomplished while working wheel sets just in the order they were delivered to the shop. Such a procedure requires more set-up time than when wheel sets of one size and type can be run. The Erie has recently been working this machine with Kennametal disposable carbide tool inserts. It is anticipated

that the use of these throw-away tool tips will make it possible to do tread work on up to 20 wheel sets per shift.

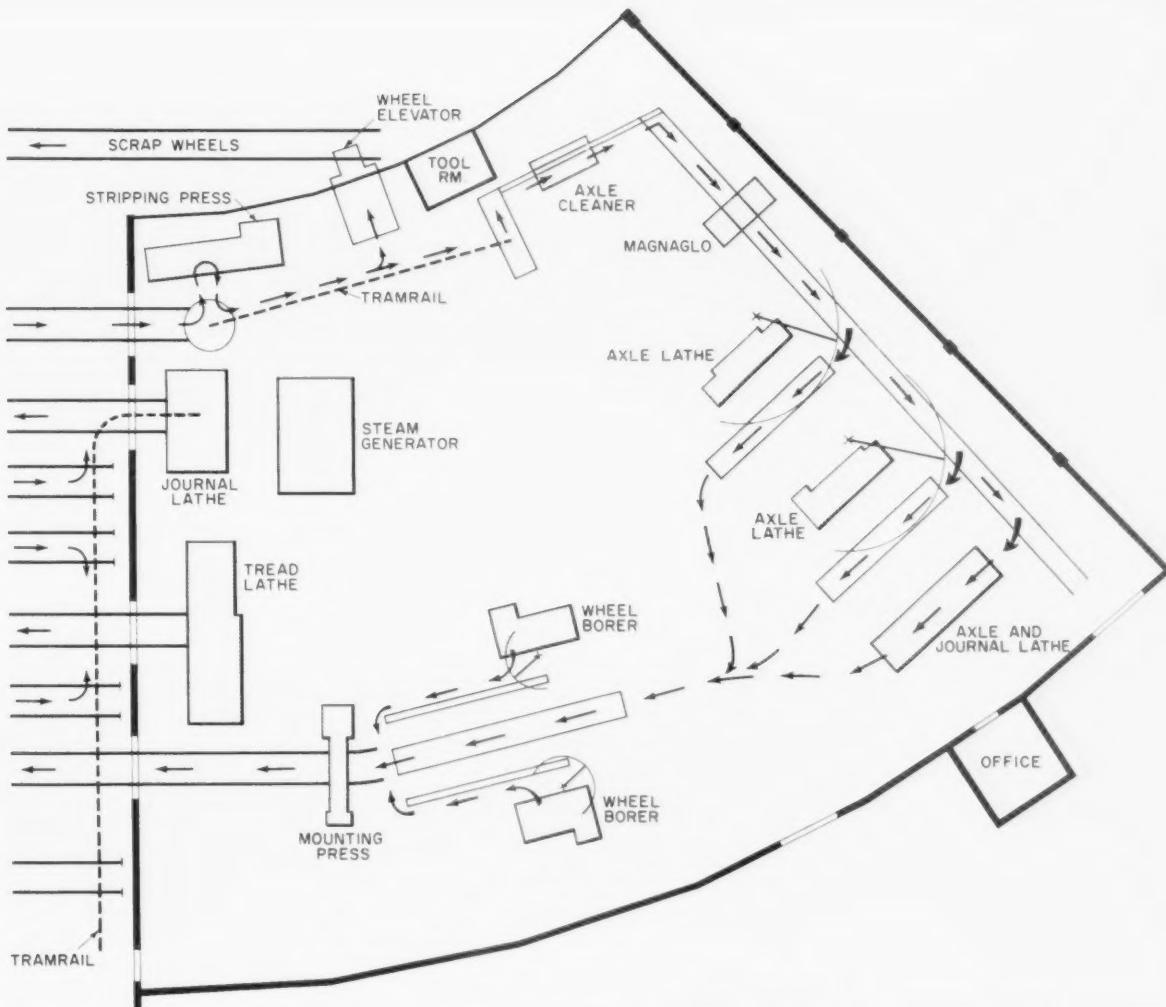
System-Wide Transportation

Increasing the production potential is important because Meadville is not only doing all the Erie's car wheels now, but nearly all the locomotive wheel work, as well. A shop adjacent to the main wheel shop at Meadville produces the Erie's new diesel wheel sets, and has facilities for inspection of traction and Spicer drive gears, and locomotive and passenger car roller bearings. Meadville does all of the routine tread and flange work on locomotive wheels, only emergency work is handled at

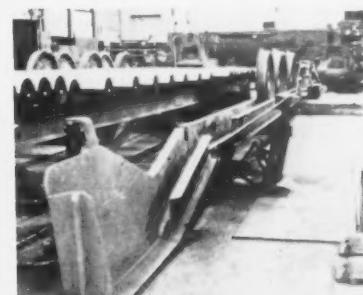
Marion and Hornell.

Moving all locomotives and car wheels to and from the central shop at Meadville requires 75 specially-equipped wheel cars. Erie's car-wheel cars will handle 21 wheel sets arranged in staggered style. The eight locomotive-wheel cars each hold ten wheel sets; two cars are assigned to each of the locomotive shops at Marion, Hornell, and Jersey City, and the other two cars supply smaller shops.

Meadville is a division point almost at the midpoint of the Erie's main line. Wheels can be moved in and out of this point rapidly; a minimum of company freight ton-miles is involved. Late this year the new Erie freight car shop will be opened (*Continued on page 46*)

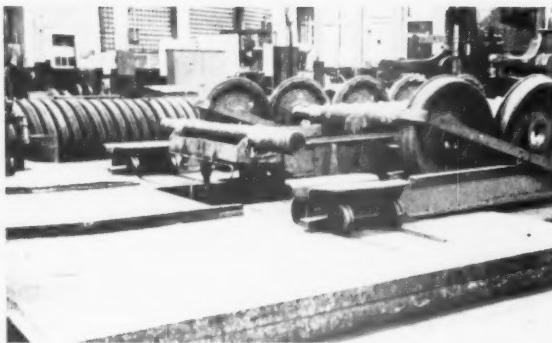


Reuse of axles requires removal of scrap wheels, cleaning, inspection, turning, machining of new wheels, and finally assembly and mounting of wheel set. This process is built around three sides of section of the former Meadville roundhouse which is now the system wheel shop.

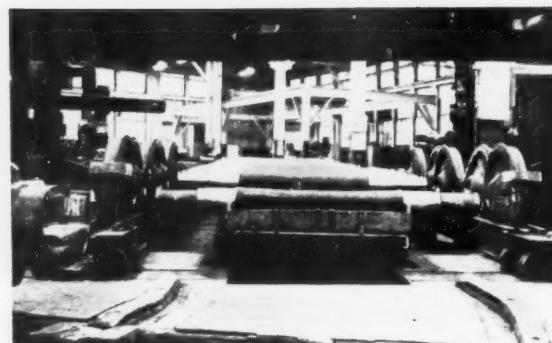


Wheel from Betts borer is placed on apron in foreground where it is brought to final vertical position and then fed to conveyor trough.

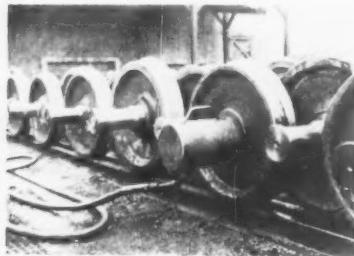
Turned and burnished axles are moved from axle lathes to the wheel press rack by lift truck. Shop is fluorescent-lighted throughout.



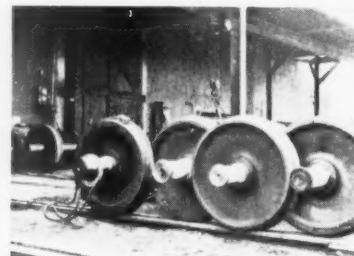
Single axle and one wheel on each side are fed to assembly position with mechanical trip mechanisms. Small cars move the wheels over axle ends.



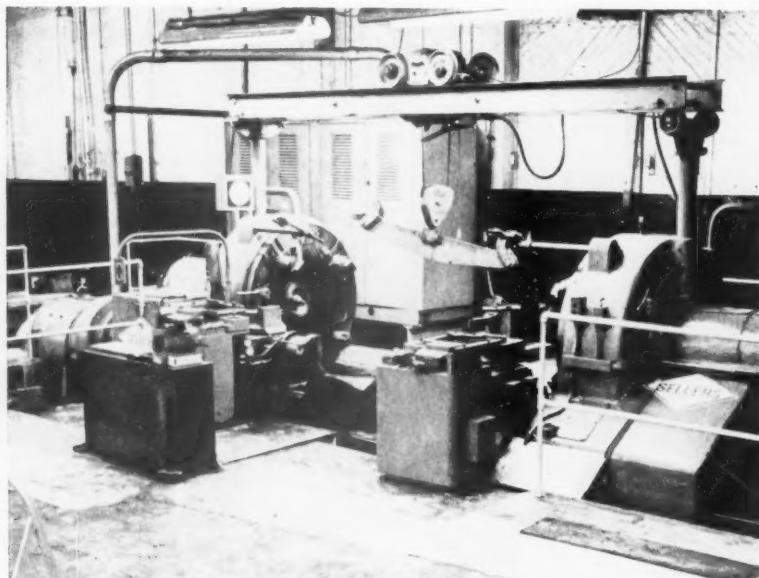
Wheel press (foreground) is last stop in operation occupying most shop floor space. Despite building shape handicap, smooth flow has been achieved.



Steam coil inside metal hood softens protective compound so journal can be cleaned prior to going into the shop.



Magnaflux leads and control cable are long enough to be used in wheel storage yard in front of the shop.



Profiling tread lathe was installed last year; was final step in bringing all car wheels to Meadville. It eliminated three tread lathes at car shops.

(Continued from page 2)
in Meadville. This will mean a major reduction in the transportation involved in moving new and turned car wheel sets. Factors which led to the establishment of the wheel shop at Meadville also played a large part

in the establishment of the new car shop at the same point.

The present freight and passenger car shop at Susquehanna, Pa., and the terminal at Jersey City sometimes send in solid carloads of passenger or freight car wheels. How-

ever, most loads of wheels are not sorted before shipment, but each wheel set is shipped with a tag indicating the AAR defect for which it was removed. All wheel sets are shipped to Meadville for disposition even though the line point has rated a wheel as suitable only for scrap. The final decision is made at the central wheel shop.

Loads of wheels are inspected upon arrival. Journals are usually coated with rust preventive prior to shipment to the shop. The Erie uses a number of portable steam-heated hoods which fit over the axle ends and soften the protective material to facilitate its removal. Wheel sets with cut journals and with wheels for turning have their journals Magnafluxed after the preliminary inspection and cleaning. This Magnafluxing is done with a portable unit which can be used while wheels are awaiting processing on outside storage tracks.

Shop Machinery

The Sellers dual end-drive journal lathe purchased in 1954 is capable of swinging 42-in. wheels and does most of the journal turning. However, a slightly older Sellers machine capable of swinging 36-in. wheels protects this machine and provides extra capacity while spending most of its time as an axle lathe.

The Sellers profiling contour tread truing lathe purchased just over a year ago is capable of handling both car and locomotive wheels. When tread and flange work is done, journals are always reworked at the same time on one of the journal lathes.

Most of the shop area is devoted to the reconditioning of old axles for new wheels, to the turning of new

axles, to the boring of new wheels, and finally to the assembly of the new wheel sets. These various functions are connected with a series of turntables, monorails, conveyors and storage racks.

A Chambersburg demounting press removes scrap wheels from the axles; the wheels are then moved from the shop to a scrap car through a wheel elevator. These axles then go to the axle cleaning machine where they are shop blasted with soft metal pellets. This cleaning machine is a converted Wheelabrator flue cleaner which the Erie rebuilt to do the axle job.

After the removal of dirt, grease and scale, axles with visible cracks are scrapped. Those remaining are measured to determine if refinishing is economically feasible. Axles which are suitable for reuse are then processed through a Magnaglo unit for final determination of surface defects. Axles can be turned in any

one of three axle lathes. Two of these are center-drive Betts machines and the third is the Sellers end-drive journal lathe previously mentioned.

The two Betts car wheel borers are located on the two sides of the rack in which axles are delivered to the wheel press. An Erie-designed conveyor system moves the wheels into position at the ends of the axle at the Chambersburg mounting press. This machine is now scheduled for replacement and the new machine will incorporate all the equipment necessary for assembling locomotive wheel sets and mounting roller bearing races.

A fork lift truck handles wheels, axles and wheel sets around the shop. This truck moves both wheels and axles from stores stocks which are maintained along paved roadways which surround the wheel shop. Well over 90 per cent of the Erie's new freight car wheels are mounted

on second-hand axles; a much higher proportion of new axles is used in assembling passenger car wheel sets. Loading and unloading of the wheel cars is done with an Austin-Western telescoping-boom hydraulic crane with a capacity of 5 tons. This truck has greatly speeded the classifying of wheels as they arrive on cars from line points. It makes possible rapid sorting of the wheel sets as to size and defect for which they were sent to the shop.

This shop is not only handling almost all of the Erie wheel work now, but is doing considerable work for other companies. There is locomotive wheel turning for nearby industrial plants which operate their own locomotives, and general wheel work for neighboring shorter railroads.

Procedures have been established, and equipment has been selected and arranged to do a big job. Today Meadville shop is doing it.

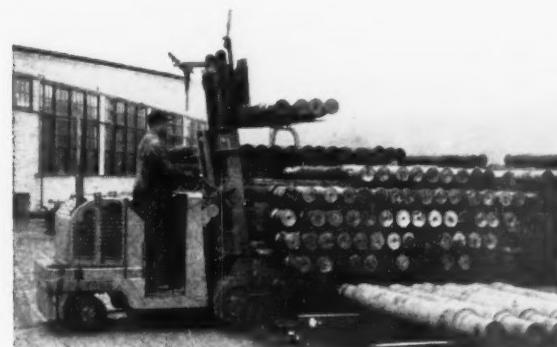
Materials Handling Is Vital To The Operation



Wheel sets are handled on and off wheel cars with Austin Western hydraulic crane truck.



Sorting of wheels on to several tracks is possible as crane removes wheel sets from cars.



Axle stocks are located around the wheel shop and are handled with fork lift truck.



Wheel handling is one-man job with special hand-operated retainer on Yale shop truck.

What Causes Gas-Turbine Road Failures?

By Ross C. Hill
Union Pacific Railroad

The 25 Union Pacific gas-turbine locomotives are assigned to freight service between Council Bluffs, Iowa, and Ogden, Utah. This run starts at 1,000 ft elevation at the Missouri River, climbs steadily for 500 miles across Nebraska to 6,000 ft elevation at Cheyenne. Thirty-nine miles west of Cheyenne, the line peaks at 8,000 ft elevation and then runs across Wyoming on a high rugged plateau, never dropping below 6,000 ft elevation. The last 65 miles of the route drop down Weber Canyon in Utah to Ogden at 4,300 ft elevation.

Weather conditions across the 1,000-mile territory vary from hot and humid to very dry and dusty. Ambient temperatures from -30 F to +100 F are not uncommon. Dust and sand storms driven by high winds occur regularly. In winter it is not unusual to run through a horizontal blizzard with little if any snow stopping on the ground.

The locomotive is subject to considerable vibration and shock from rail and drawbar effects. Surrounding air is contaminated with dirt from ballast and rail sanders. The low-grade residual fuel required for economical operation imposes additional difficulties in combustion and fuel handling and adds to control complications. Track profile and traffic conditions necessitate frequent load cycling between idle and

From a paper presented before the ASME Gas Turbine Power Conference held at Detroit, March 19-21, 1957.

full power. A large number of shutdowns and startups are required to conserve fuel.

The first of the Union Pacific's 25-gas-turbine-powered locomotives was delivered in February 1952. By the end of August 1956, one of the turbines had accumulated 17,704 fired hours, with the balance graduating down to a minimum of 7,332 hr. All of the 27 turbines, including two spares, have been out for modification and repair at least once.

Maintenance Problems

In the past four years, many maintenance problems have arisen. Some have been solved. Since a study of all the problems encountered would be too lengthy, a record of the defects occurring during August 1956, has been selected as representative. During that month each of the 25 operating turbines accumulated an average of 432 fired hours out of a possible 744 hrs.

During August there was a total of 22 reported defects with 14 locomotives involved. The defects can be classified as 15 control failures, five turbine-component mechanical failures, one case of wear, and one failure due to manufacturing error.

Gas-turbine performance records are being hurt by failure of auxiliary components which are not designed as well as the machine itself. Realizing that precise regulation is required in order to extract the utmost in efficiency from modern machines, the job is only half done when the precision control is not mechanically able to do its job satisfactorily.

Many of the control failures can be classed as nuisances as far as repair costs are concerned, but they are very serious from the standpoint of reliable operation and costs chargeable to delayed trains.

Attempts to dig deeper into the reason for locomotive failure are often very frustrating. In all too many cases, the defect is transient and there may be many cases before the answer is uncovered.

While it is indeed true that railroad inspection and maintenance practices are not overly elaborate, the majority of failures must be charged to the fact that control devices and auxiliary equipment designed primarily for stationary service usually lack the ruggedness and simplicity needed for railroad service.

In the trend toward automatic operation there is a tendency on the part of control designers to make control systems overly complicated. There is also a tendency to overcome faults in control devices by the addition of another device rather than correcting the basic fault.

To date, the Union Pacific has not accumulated sufficient gas-turbine experience to assign an estimated life to turbine components. During this development period there have been so many modifications that life data on most components are very clouded. There have been some spectacular improvements in individual items such as fuel nozzles and combustion chambers, but it is still to early to tell where developments will lead.

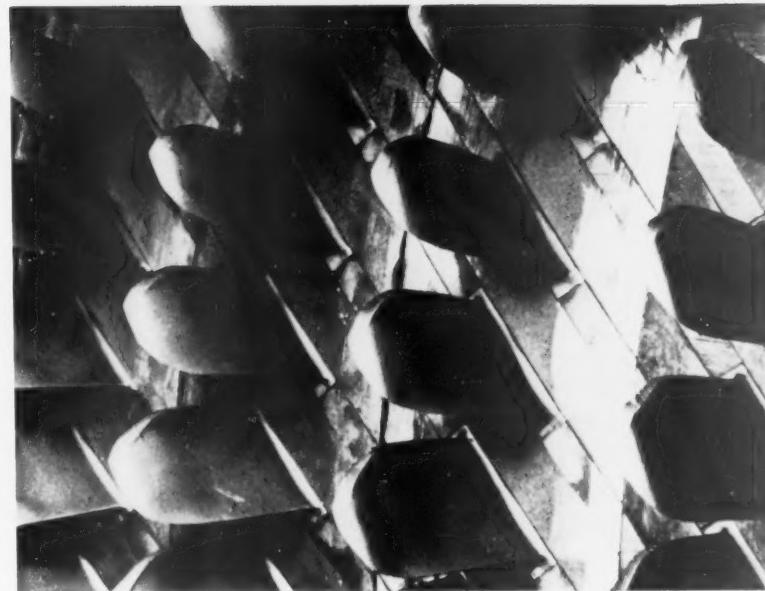
Blade erosion on the compressors is not fully pinned down at present, but the tentative pattern indicates that compressors will require re-blading at about 15,000 hr under present conditions. Erosion conditions appear to be worse on the Wyoming Division, possibly due to the presence of fine cinders from coal-burning steam locomotives. One turbine which operated for 3,000 hr between Los Angeles and Las Vegas showed a much slower-than-average erosion rate even though operation was in desert territory with occasional sand storms. On this run there are no cinders



Gas-turbine electrics on Union Pacific haul insulated tenders regularly. This increases lengths of runs without refueling. Units experienced 8.7 failures per 100,000 locomotive miles last August.

and no overhead coal chutes. Compressor air inlets are now on the roof of the locomotive with no filtering. This has eliminated blade fouling which occurred when air was taken inside the cab through viscous impingement-type filters. Blade erosion occurs at the tips of the rotor blades and at the roots of stator blades. This is fortunate since excessive centrifugal stresses do not occur as a result of wear.

The foregoing might leave the impression that gas turbines are too unreliable for locomotive power plants. A brief look at the performance record shows that the opposite is true. During the month of August, the active fleet of turbine locomotives averaged 12,026 miles each, which was considerably better than any other type of freight locomotive assigned to the same district. The turbines handled 18.2 per cent of the freight hauled on the Eastern District and 11.5 per cent of the freight on the entire Union Pacific. Records show that the turbine failures detailed here occurred at a rate of only 8.7 per 100,000 miles, which is not a bad record. These locomotives consistently move trains



Blade erosion on gas turbine compressor rotors occurs at blade tips. Even though it is not fully understood, wear pattern does not increase centrifugal stresses.

faster than other types of freight power, with the August average being 34.95 train miles per train hr. This is 6 mph faster than comparable diesel-electric units. This performance is very attractive to the

Union Pacific in its constant effort to speed up freight movement. While failures cannot be ignored, they can be endured during the development of a power plant which excels in performance.

THESE WERE LAST AUGUST'S GAS-TURBINE FAILURES

LOCOMOTIVE 51 One control failure

August 24: Turbine shut down for unexplained reason. Delayed two passenger trains and three freight trains. Turbine could have been restarted with little delay if it were not for a chronic secondary failure. Spark gap ignition plugs are not reliable under the adverse conditions of a Bunker C shutdown. They are not able to ignite the residual fuel and often become coated and ground out while fuel lines are being purged of heavy fuel. With a reliable ignition system, these failures could be relegated to nuisances.

LOCOMOTIVE 52 Two control failures

August 8: Lost 2 hr 10 min running time because the inlet temperature control cut the power due to a false indication. Inspection of the pneumatic temperature control system disclosed an air leak at a flared fitting. This failure is chargeable to the use of copper tubing and a flared connection at a point subject to high-frequency vibration.

August 8: Delay of 1 hr 30 min while

getting a helper locomotive. Indication was the same as that of previous failure; but reason could not be found and trouble did not recur.

LOCOMOTIVE 54 Two control failures, one mechanical failure

August 8: Locomotive was charged with unscheduled shop time to change out a failed atomizing air compressor. This is a two-stage centrifugal compressor which boosts main-compressor discharge air approximately 2 to 1 for the air-atomizing fuel nozzles. It is driven by an extension from the turbine shaft. Impeller speed is approximately 52,500 rpm. The sleeve bearings on the impeller shafts have been judged to be marginal since the majority of compressor failures have come from failed bearings. Bearings and shaft seals have been redesigned to improve the condition. It has been necessary to apply large vents from the bearing housing to prevent pressurizing the lube-oil tank through the bearing drains. Prior to this modification, it was possible to blow all the oil out of the tank and fail the turbine bearings.

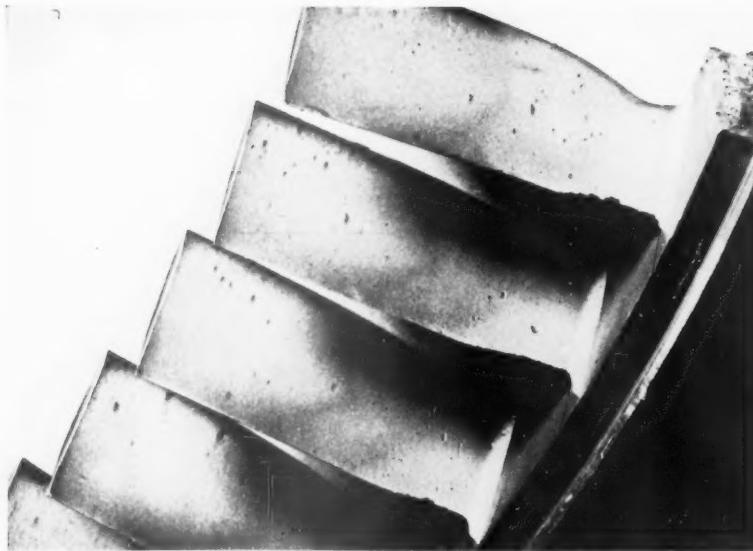
August 11: Locomotive lost 40 min running time because of low power. This was again traced to a broken copper tube at a flared connection.

August 24: Turbine died. It was necessary to get another locomotive because the turbine would not fire. Three trains were delayed. It was necessary for maintenance forces to make temporary repairs to high-voltage ignition-plug lead before the turbine could be started. Possible cause of the initial failure was located in a failed relay coil in one of the parallel flame-detector circuits. Ignition leads cause periodic trouble from insulation failure. Flame-detector circuits handle relatively weak signals generated by thermopiles. These are subject to trouble from insulation failure and high resistance junctions.

LOCOMOTIVE 55 One control failure

August 6: Locomotive was held for unscheduled work consisting of replacing an electrically grounded flame-detector panel. Failure of the panels usually is caused by failed insulation.

(Continued on next page)



Compressor stator blade erosion takes place at the base of the blades. Union Pacific investigations indicate reblading after 15,000 hrs.

LOCOMOTIVE 56 One mechanical failure

August 15: Locomotive was held to change the atomizing air compressor because of slight pressurization of the lube-oil tank. This was not an effective remedy, so the locomotive was again held while investigation determined that the source of pressurization was in turbine main-bearing seals. It was necessary to remove the turbine and dismantle it to learn that the No. 3 bearing seal was worn due to vibration introduced by a clearance fit instead of the required interference fit at the spline hub at the flexible connection between the turbine and compressor. This minor mechanical fault took the turbine out of service for nine-days during August. It was unfortunate that the failure occurred while the spare turbine was not available during com-

pressor reblading. This machine had accumulated a total of 15,463 hr since it was put into service in February, 1952. It had been operated only 369 hr since the last disassembly to replace bearing wiped because the lube-oil tank had been blown dry.

LOCOMOTIVE 58 One control failure, one mechanical failure, one wear failure

August 6: Turbine failed to fire leaving North Platte, resulting in delays of 30 to 50 min to five manifest trains. Inspection developed that both spark-plug leads were shorted. The turbine alternator-field contactor was sticking, making it impossible to complete the turbine-cranking cycle.

August 11: Locomotive was delayed 50 min because it was impossible to crank the turbine successfully after a shut-

down for test group to make adjustments in temperature control.

August 15: Locomotive lost 1 hr 30 min running time because of low power turbine. This defect was caused by eroded compressor blading which resulted in loss of compressor efficiency and net power.

August 15: Locomotive suffered delay due to failure of a wire-reinforced neoprene hose used as a flexible connection between locomotive piping and turbine-fuel pump. The hose carries diesel fuel used as fuel-pump control oil. Age of the hose could not be determined.

LOCOMOTIVE 59 One control failure

August 1: Locomotive lost 30 min running time due to low turbine power. Investigation developed a cracked bellows in a pneumatic temperature control device giving false indication of excessive temperature. The failure of the bellows was due to fatigue caused by vibration.

LOCOMOTIVE 61 One control failure

August 24: Locomotive experienced failure similar to that of Locomotive 59. Temporary repairs were made by bypassing the pneumatic relay involved without loss of temperature control. This raises doubts as to whether the device is necessary.

LOCOMOTIVE 65 Two control failures

August 10: Locomotive was removed from a train departing from Cheyenne because the turbine quit firing. Investigation developed that failure was caused by movement of a plastic-insert-type lock nut which loosened from vibration.

August 29: Turbine died resulting in a 1 hr 5 min delay. Inspection failed to develop a reason for the failure.

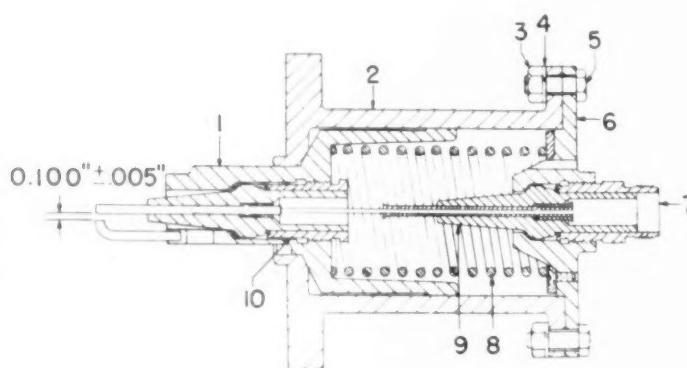
LOCOMOTIVE 67 One control failure

August 24: Turbine would not fire at Ogden. Investigation developed that both high-voltage ignition-plug leads had failed.

LOCOMOTIVE 69 Two control failures

August 8: Locomotive delayed 1 hr 30 min. Investigation disclosed that a pneumatic time-delay relay used in the cranking cycle failed to function. This prevented completion of cranking.

August 12: Turbine quit firing. Investigation finally developed that erratic



Spark plug assemblies in combustion chambers have caused trouble. Parts are 1 piston, 2 body, 3 nut, 4 lock washer, 5 bolt, 6 cap, 7 bushing, 8 spring, 9 core assembly, and 10 bushing.

(Continued on page 52)

ICC Would Get 'Tough' on Brakes

Safety appliance act changes recommended as ICC cites 'deterioration' in inspection and maintenance

Railroad air brake maintenance and inspection practices have "progressively deteriorated" over the past three years according to the 70th annual report of the ICC. The commission went on to recommend that the Safety Appliance Acts be amended to give the commission "authority to prescribe rules, standards and instructions for the installation, inspection, maintenance, and repair of power or train brakes."

"The suggested legislation," the commission also said, "is needed because it has become apparent that the carriers are unable to cope with non-observance of their own rules, or by design, have attempted to evade the minimum requirements of safety. . . . Even among railroads which have adopted the voluntary code of the Association of American Railroads, there has been wide spread non-observance of the rules, particularly with respect to train-brake inspections.

"The proper inspection, maintenance, and testing of power or train brakes by the carriers are ab-

solute requisites for safe train operation. We urge that the Safety Appliance Acts be amended as recommended in order to provide the degree of safety therein contemplated for employees and the traveling public."

This recommendation amounted to commission performance on its promise to the BLF&E and BRT. The promise, to seek legislation, was made in a report in which the commission found that it lacked power to prescribe brake-inspection rules sought by the Brotherhoods (Railway Locomotives and Cars, March, 1957, p. 16).

Larger Fines

The report of the ICC's section of railroad safety of the bureau of safety and service, made to the commission, recommended that the penalty for violation of the Safety Appliance Acts be raised from \$100 to \$500. The \$100 penalty was fixed in the act in 1893. The section report stated that "In the period of

more than 60 years since that time, the value of the dollar has decreased to such an extent as to make the present penalty of little value as a deterrent to violating the law. To bring this penalty more in line with present-day values and restore its intended function, it is recommended that it be increased to \$500 for each violation." No action has been taken on this.

The safety appliance defect ratio for locomotives, freight and passenger cars for the year ended June 30, 1956, was 36 per cent higher than the average for the last ten years, and it was the highest recorded during that time. Only the figures for 1954, 1955 and 1956 exceeded the ten-year average, and the 1956 results are up 15 per cent over 1955.

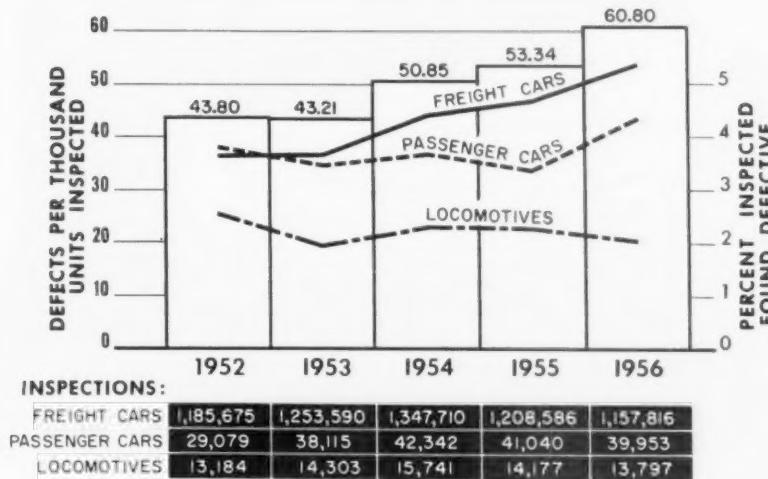
Of the 1,157,816 freight cars inspected, 5.33 per cent had defective safety appliances. This exceeded the passenger car ratio which was 4.36 per cent and the locomotive figure which was 2.03 per cent.

During the year, 61 complaints were investigated. Thirty involved power brakes and 31 involved other safety appliances. In 19 of these investigations, evidence of violation was obtained and prosecution on 134 counts was instituted. The section report went on to say that in many other cases "investigation resulted in the unsatisfactory conditions complaint of being corrected."

Brake Tests

In a case involving the Alabama Great Southern in which a safety appliance became defective on a car during a continuous movement to a point of interchange with a connecting carrier, a Fifth Circuit court held that "nothing less than literal compliance will suffice, and that the statutory liability arises irrespective of any duty of inspection and regard-

ICC Finds More Safety Appliance Defects



less of a complete lack of fault on the part of the railroad."

Although cars in trains arriving at terminals and checked by ICC inspectors had 97.9 per cent of the air brakes operative, the report pointed out that 9.14 per cent of them were of "impaired efficiency due to excessive piston travel." Trains departing terminals, and checked, had 99.9 per cent of the brakes operative, but it was necessary to repair brakes on 4,634 cars remaining in trains, and to set out 3,221 cars. The average departing train had 47.3 cars and it was necessary to set out or repair an average of 3.16 of these. Had these trains departed prior to inspection, the section reported that "the percentage of operative brakes would have been only 93.2."

Here Is What ICC Inspectors Found During Train-Brake Tests

	Trains Departing From Terminals	Trains Arriving At Terminals
Railroads	139	110
Trains Inspected	2,484	1,588
Cars Inspected	117,399	96,962
Brakes Cut Out	8	275
Brakes Did Not Apply	141	1,805
Cars Not Controlled By Air*	152	2,083
Cars Controlled By Air	117,247	94,879
Cars Controlled By Air (Percent)	99.9	97.9
Excessive Piston Travel	5,360	8,867
After Inspection Began:		
Cars Set Out	3,221
Cars Repaired In Train	4,634

*—Whenever the sum of cars with "Brakes cut out" and cars with "Brakes that did not apply" is less than the number of "Cars not controlled by air," the difference is the number of nonair cars hauled in the trains tested.

AAR Opposes Pending Brake Laws

Enactment of pending legislation requiring the Interstate Commerce Commission to prescribe rules for power or train brakes would "impose more regulation upon an already over-regulated industry."

The proposed legislation, Richard G. May, vice-president in charge of the Operations and Maintenance Department, Association of American Railroads, testified before a subcommittee of the House Interstate and Foreign Commerce Committee, "would establish unnecessary rigidity and require the expenditure of effort and money by the railroads that might better be spent on other matters that are of at least equal importance in railroad safety."

Terming the legislation "unnecessary" and "without justification," Mr. May went on to point out that the proposed bill could delay the adoption of new devices, improvement in present power operated brake systems, new methods of inspection and new methods of repairs.

He asserted that if this were to materialize "railroads would lose for long periods of time the benefits of much needed economies, improved efficiency and even greater safety."

As important as power brakes are in the railroad safety picture, Mr. May continued, of equal importance are automatic block signals, central-

ized traffic control, durable rails, ties, bridges and many other elements that combine to keep the railroads running.

The railroad officer said passage of the pending legislation would give the ICC jurisdiction over a legitimate field of managerial discretion where management has compelling motives for maintaining the highest degree of safety and efficiency.

In such an instance, he cautioned,

railroad management would thereby be precluded from adopting brake safety procedures prompted by their need to improve safety without the necessity of long hearings and the attendant delays necessarily associated with administrative procedures.

This, Mr. May said, would prevent the exercise of initiative and acceptance of responsibility by management in an important area of operations.

Gas Turbine Failures

(Continued from page 50)

operation of the fuel regulator was responsible.

LOCOMOTIVE 70 One mechanical failure, one error

August 6: Locomotive was held to change a failed atomizing air compressor. Investigation developed that failure was caused by excessive turbine vibration. After the turbine was disassembled, source of the vibration was traced to a manufacturing error. A short turbine-rotor shaft at the No. 3 bearing resulted in a short interference fit at the spline hub. The short fit wore excessively after 1,989 hr.

LOCOMOTIVE 73 One mechanical failure

August 12: Turbine died on the road. The train was delayed 2 hr 30 min with three other trains held up from 30 min to 1 hr while obtaining a replacement locomotive. The trouble was found in the fuel regulator, which had jammed and stripped gears in the drive mechanism.

LOCOMOTIVE 75 One control failure

August 12: Turbine quit firing leaving Cheyenne. Defect was traced to air leaking from wire-reinforced hoses used in connections to the turbine temperature control panel. Hose had become porous due to baking from external heat in the vicinity.

SP Building 350 Hydracushion Box Cars

With the completion of two years of successful road tests, the Southern Pacific now plans to construct 350 of the new hydracushion underframe box cars at its Sacramento shops.

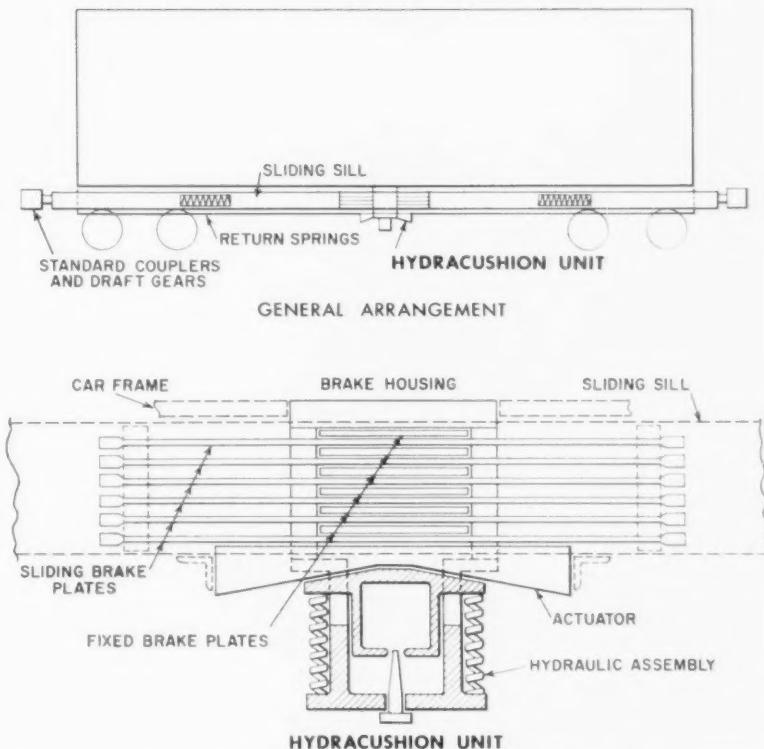
Developed by the Stanford Research Institute, under SP's sponsorship in conjunction with SP research engineers, this new underframe is designed to ease the shock of coupling cars. The package unit now to be used replaces the original design described in our June, 1955, issue, p. 61. According to SP officials, the device reduces the impacts of cars meeting at 10 mph to the equivalent of a 4-mph coupling.

The main parts of the device, says the SP, are a set of sliding friction plates actuated by a hydraulic device to produce cushioning action between the carbody and the floating car sill. This floating car sill runs the length of the car and carries the couplers and standard draft gears.

Absence of Recoil

As the car sill moves under the shock of coupling, hydraulic pressure from the cylinder squeezes the sliding brake plates against the fixed brake plates producing shock absorption without undesirable recoil proportional to speed and severity of impact. The springs return the sliding car sill to normal position.

Other special features being incorporated in the new box cars will include Evans DF loaders and roller bearings.

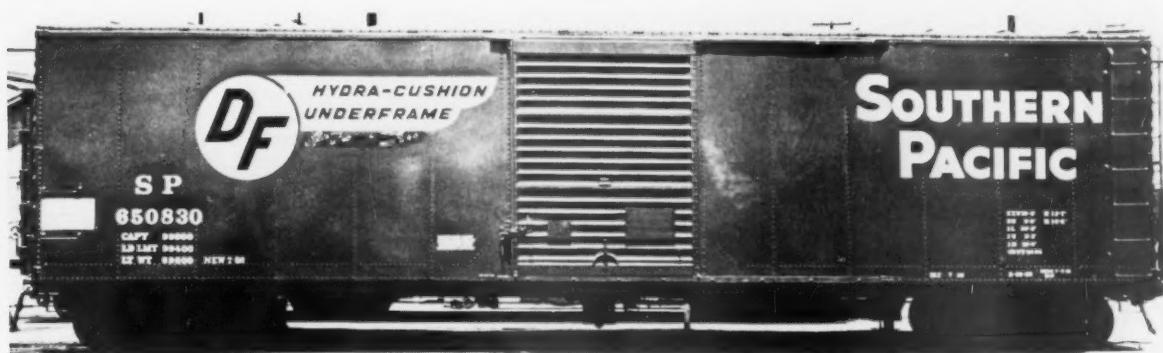


Hydracushion unit is mounted at center of the car. Earlier model had brake housings near bolsters.

Striking Car Sill Loads During 7-mph Impacts

Striking cars were equipped with various energy absorbing arrangements, and data was obtained from oscillograms made during tests. All cars weighed 169,000 lb and the struck car was equipped with standard friction gears.

	Buff (lb)	Recoil (lb)
Friction Draft Gear	660,000	140,000
Rubber Draft Gear	515,000	150,000
Cushion Underframe A	410,000	165,000
Cushion Underframe B	265,000	180,000
Hydracushion	220,000	0



Hydracushion underframes, DF loaders and roller bearings are all being used in 350 new SP box cars.



'Speed Merchants' Haul New Haven Talgo

Each of the two 1,720-hp Fairbanks-Morse lightweight locomotives has a single, constant-speed diesel engine.

Two 1,720-hp Fairbanks-Morse "Speed Merchants" are hauling the New Haven Talgo streamliner, the "John Quincy Adams," between Boston and New York. The "Speed Merchants" were designed to haul the five-car ACF Talgo at speeds up to 115 mph, and to have sufficient power to accelerate the train up to 80 mph in 4.45 min and 4.2 miles. The locomotives switch from diesel-electric to third-rail power while in motion, eliminating the necessity for changing to electric locomotives. The "John Quincy Adams" has one "Speed Merchant" at each end, one pulling and the other pushing. The train operates equally well in either direction, and both locomotives can be controlled from either cab. There is no need

to turn the train for the return trip.

The design of this locomotive is intended to cut initial cost, fuel consumption, and maintenance expense. The major means of accomplishing these was to make one diesel engine provide power both for traction and for train service. This eliminates the need for any auxiliary engine. This led to lower weight, demanded less space, and reduced the quantity of auxiliary equipment. It means only one engine per locomotive to crank for the changeover from third-rail to diesel-electric power.

Standard FM Engine

The Speed Merchant's single prime mover is an 8-cylinder Model 38D8 $\frac{1}{8}$ Fairbanks-Morse opposed-

piston diesel with a rating of 1,720 hp at 850 rpm. The diesel drives a 600-v dc main traction generator and a 436-v, 3-phase, 56.7-cycle alternator to supply all train service requirements. In conventional locomotives, the main engine varies its speed to meet load fluctuations. In the Speed Merchant, the single diesel runs constantly at 850 rpm, providing steady voltage and frequency for the train service equipment despite the varying traction requirements. This constant-speed, variable-load operation is similar to stationary power plant service. Instead of varying engine speed, the Speed Merchant regulates output of traction power by controlling the generator field through the amplitidyne exciter.

Engineman's controls include controller and reverser (left), diesel-electric and third-rail switchover (oval knob), single push button to start engines in both units, and the control for Westinghouse "26" air brake (right).



Fairbanks-Morse locomotives on ends of New Haven Talgo each weigh 216,000 lb. Units are 60-ft long, 10-ft 6-in. wide, and 12-ft high. Third rail shoe assemblies are mounted on inboard ends of each truck. "Speed Merchants" were originally described in the January 1956, issue, p. 43.

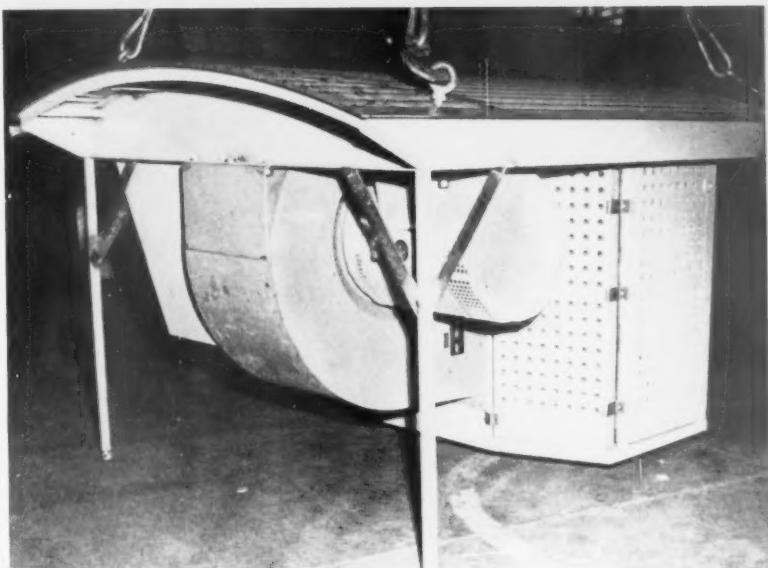


ACF calculates that maximum a-c electrical demand for air conditioning, heating, lighting and miscellaneous needs of one three-unit articulated car approximates 40 kw, or a total of 200 kw for the five-car train. The cars depend on head end power for normal operation but have batteries and trickle chargers for emergency use. Except in severe winter cold, just one of the two locomotive units could handle the needs of all five cars without cutting into traction power. Each diesel has a minimum of 1,200 hp available for traction at all times, a total of 2,400 hp for the two locomotives.

The traction generator is a conventional GE shunt-field machine with a series winding for cranking the engine from the battery; there is a standard belt-driven 12 kw, 75-v dc auxiliary generator. The two traction motors on the truck at the cab end are GE 752's.

Special Electrical System

As described to this point, the locomotive is available for regular light train diesel-electric service and two such units are on order for the Boston & Maine. For the New Haven train, electrical equipment was arranged and additional equipment provided to permit operation on third-rail power. The main dc generator still is driven directly through a flexible coupling, but the 233 kw alternator and an added 600-v dc generator are driven through an overriding clutch. During diesel-electric operation, this

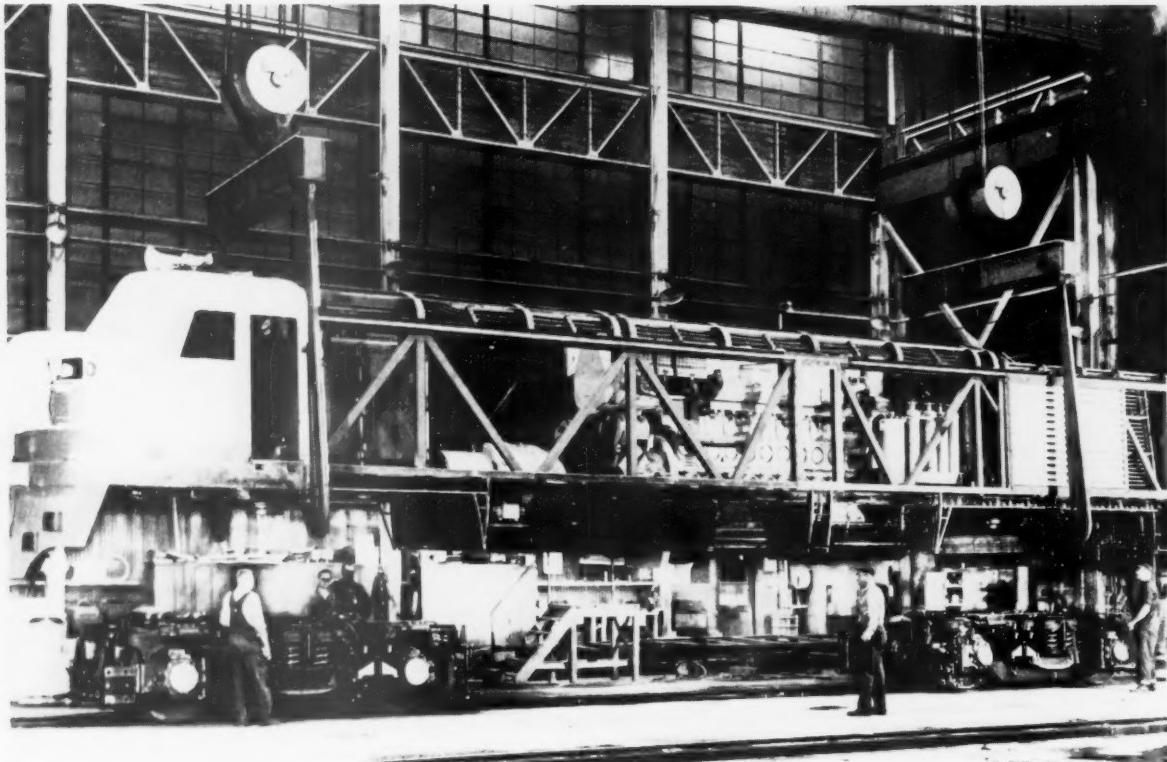


Engineroom air is taken at roof level by 20,000 cfm blower through a set of self-scavenging centrifugal dirt separators. Equipment operates under slight pressure instead of in vacuum of conventional diesel locomotives.

auxiliary 600-v machine supplies power to the air compressor, traction motor blowers and fan motors. When locomotive moves into third-rail territory, however, this dc generator becomes a motor operating on third-rail power and performs its primary function of driving the alternator, assuring uninterrupted train service. The traction motors, as well as the 600-v motor-driven auxiliaries, then get their power supply directly from the third rail. Despite normal variations in third-rail voltage, the alternator is run at constant speed by using the ampli-

dyne exciter to govern excitation of the drive motor.

When starting the train in diesel-electric operation, the controller progressively increases amplidyne excitation and resultant main generator excitation, developing a family of generator curves similar to conventional locomotive curves with a variable speed engine. During third-rail operation, automatic resistor control is provided for smooth acceleration in 12 steps under control of a current relay. Notching is automatic but under the control of the engineman who may vary rate



Main sills on 69-in. centers with dropped mid-section permit mounting engine with its lower crankshaft 48-in. above rail. Outside swing hanger trucks have bolster coil springs and friction snubbers on 97-in. centers.

of acceleration with the same controller handle used for diesel-electric operation.

Here is how the switchover from one power source to another is accomplished: With the train operating on third-rail power, the motor-alternator set is running at a speed between 850 and 900 rpm, with the controller in one of the operating positions for third-rail propulsion. Traction motors are in series on full field. Preparatory to changing over, the diesel engine is started by cranking with the main generator running as a series motor from the 64-v battery. The diesel is always warm and ready for a quick start because of third-rail-powered immersion heaters in the cooling water system and a special heat exchanger for the lubricating oil.

After the engine has started and run briefly at idle speed, it is brought up to its normal operating speed of 850 rpm and is ready to take the load. The engineman then moves the controller handle to idle and throws a transfer switch from third-rail to diesel-electric position. This disconnects the big dc motor from third-rail power. When the speed of

the motor-alternator set drops to engine speed of 850 rpm, the overriding clutch engages and the dc machine, alternator, exciter and auxiliary generator are driven by the engine. Power and auxiliary equipment circuits are changed by a multi-contact transfer switch with controller at idle. The engineman then advances the controller for normal diesel-electric operation.

Special attention was given to keeping equipment free of contamination. The engine room of the Speed Merchant is pressurized to 0.5-in. of water with a centrifugal blower. Air for the diesel is farther cleaned in centrifugal separator intake air cleaners which are continuously scavenged through aspirators in the exhaust stacks. The main generator and other rotating equipment in the room are cooled by self ventilation, discharging a high percentage of the total volume of cooling air to atmosphere. The motor-driven two-stage air compressor draws air from the engine room and discharges through a finned-tube aftercooler to two main reservoirs connected in series. Each traction motor is force-ventilated

with outside air by a motor-driven blower directly below the cab.

A separate section at the rear of the main engine room houses the engine cooling system, including radiators, inlet shutters, and motor-driven exhaust fan. Located between the two radiator banks and giving minimum air flow interference is the 725-gal fuel tank.

Line of draft at the rear coupler is nominally 21 in. above the rail. The coupler contains connectors to trainline all locomotive and train service functions, so that coupling locomotive to train automatically makes all connections necessary for operation. With center of gravity of the sprung mass only 24 in. above the plane of the bolster springs (40 in. for a conventional locomotive) and spring centers of 97 in. (compared to a conventional 60 in.), the Speed Merchant has substantially less lean or roll.

Clasp-type brakes on all wheels have composition shoes. The brakes will produce a retardation rate of about 1.5 mph per sec. The air brake control equipment utilizes one trainline pipe for both control and air supply.

HOW TO

Learn About Air Brakes

... AND HAVE FUN DOING IT

24-RL Automatic Brake Valves

FIRST SERVICE Position—First Phase (Sketch 10)

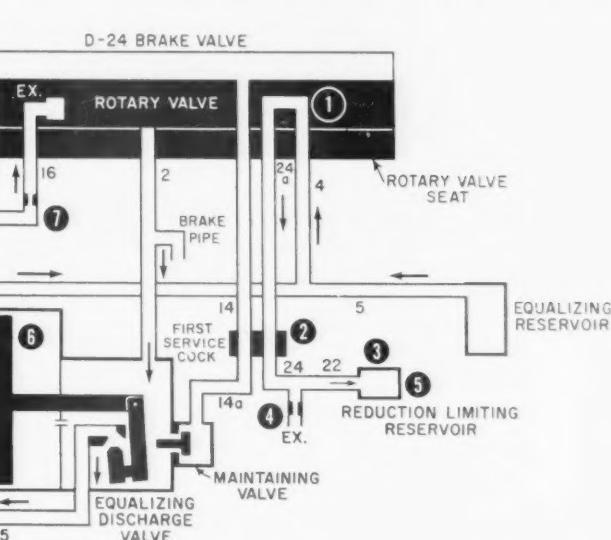
FIRST SERVICE position application causes a normal, light, initial reduction, then reduces the brake pipe pressure at a slow, controlled rate. This prevents an excessive difference in brake cylinder pressure between the front and the rear of the train. In the first phase of first service, the equalizing reservoir pressure is connected to the empty reduction limiting reservoir (through the first service cock), reducing equalizing reservoir pressure about

six lb at the normal rate.

Color in carmine the short branch of passage 30 to the block marked *Feed Valve*. With orange, color the feed valve, passage 21, the entire space over the rotary valve, and passage 32 back to the feed valve. Go into passage 14, through the first service cock, passage 14a, and the space around the maintaining valve. Dampen and let dry.

With yellow pencil, fill the entire area to the right of the equalizing piston. Continue through the choke and the space around the equalizing discharge valve, and then through passage 2 to the rotary

valve. Color past the open equalizing discharge valve into passage 15, passage 16, and then to the atmosphere at EX. After the yellow has been dampened and let dry, proceed in light green into the space at the left of the equalizing piston, passage 5, the equalizing reservoir, passage 4 to and including the cavity in the rotary valve. Stop where the rotary valve contacts its seat. From there, fill in with dark green passage 24a, through the first service cock, passage 24, pipe 22, and the reduction limiting reservoir. Include the short branch through the choke to EX. Dampen and let dry.



Sketch 10 FIRST SERVICE Position—First Phase

1. Equalizing reservoir pressure in passage 4 to passage 24a.
2. From passage 24a through the first service cock into passage 24.

3. Passage 24 to pipe 22 to the reduction limiting reservoir.
4. From the reduction limiting reservoir to EX through the choke.
5. The equalizing reservoir pressure expands into the reduction limiting reservoir, reducing the equalizing reservoir

- pressure about six lb at the normal rate.
6. The equalizing piston moves to the left, opening the equalizing discharge valve.
7. Brake pipe pressure flows past the equalizing discharge valve into passage 15, passage 16, and then to exhaust.

**FIRST SERVICE Position—
Second Phase (Sketch 11)**

The flow of equalizing reservoir pressure into the reduction limiting reservoir has reduced this pressure

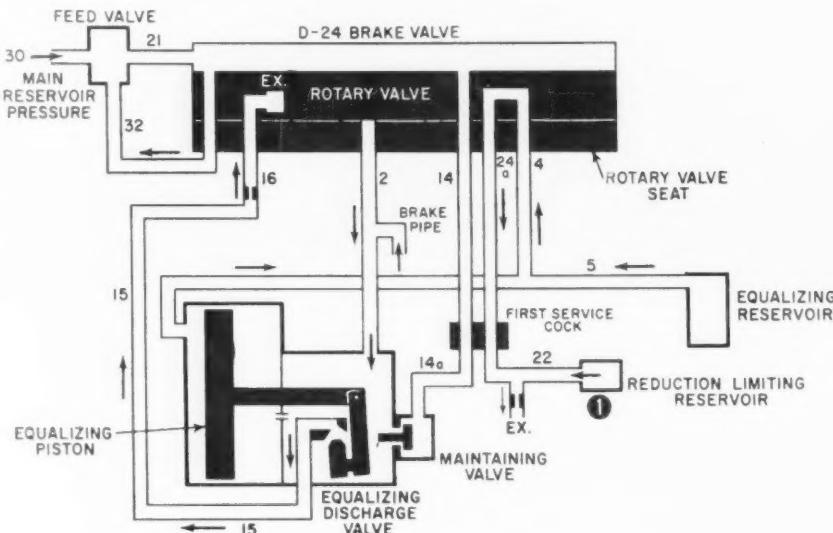
about six lb, and the reduction continues at a much slower rate (from both reservoirs) through a choke. This sketch is colored the same as Sketch 10. Note that the flow of air

is now from the reduction limiting reservoir, as the volume of both reservoirs reduces through the choke.

Sketch 11

**FIRST SERVICE Position—
Second Phase**

1. The remainder of the twenty lb reduction continues at a much slower rate. The volumes of both reservoirs flow through the choke to exhaust.



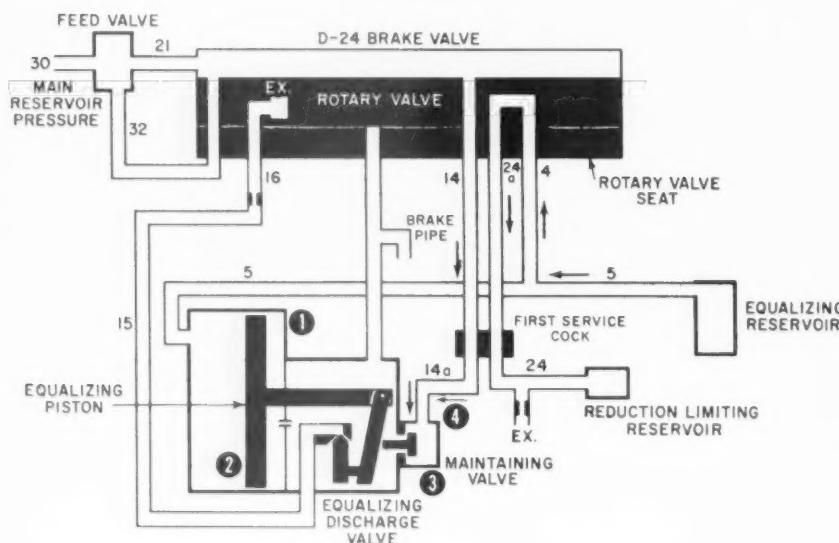
Pressure Maintaining During FIRST SERVICE Operation (Sketch 12)

If the brake pipe pressure becomes slightly lower than that of the equalizing reservoir, the equalizing piston will move to the right and allow the equalizing discharge valve to close. This may be a result of too rapid reduction of the brake pipe

pressure at the front of the train. This prevents further flow of brake pipe air to the atmosphere. If the brake pipe pressure reduces faster than the controlled rate of the equalizing reservoir pressure reduction, this pressure will be less than that of the equalizing reservoir acting on the left side of the equalizing piston. This moves the piston to the right, opening the maintaining valve

and allowing feed valve air to flow into the brake pipe. Such an action causes a slower brake pipe reduction throughout the train than otherwise possible.

Changing to carmine, fill in the short branch marked *Main Reservoir Pressure* leading to the feed valve. Now switch to orange and color passage 21, the space above the rotary valve, passage 32 to the



Sketch 12

Pressure Maintaining During FIRST SERVICE Operation

1. Because of leakage the brake pipe pressure reduces at a faster rate than the controlled reduction of the equalizing reservoir pressure.
2. The piston is moved to the right, and the equalizing discharge valve seats itself.
3. The continued movement of the piston to the right opens the maintaining valve.
4. Feed valve air flows past the maintaining valve to the brake pipe.

feed valve, passage 14 through the first service cock, passage 14a, and on past the open maintaining valve. Stop at the equalizing discharge valve chamber. Dampen and let dry.

From this point, and with yellow, proceed into the equalizing discharge valve chamber, through the choke (including the space to the right of the equalizing piston), and

into passage 2 to the rotary valve. In yellow dashes color passages 15 and 16 to EX. Dampen and let dry. Repeat the light and dark green shading as in sketches 10 and 11.

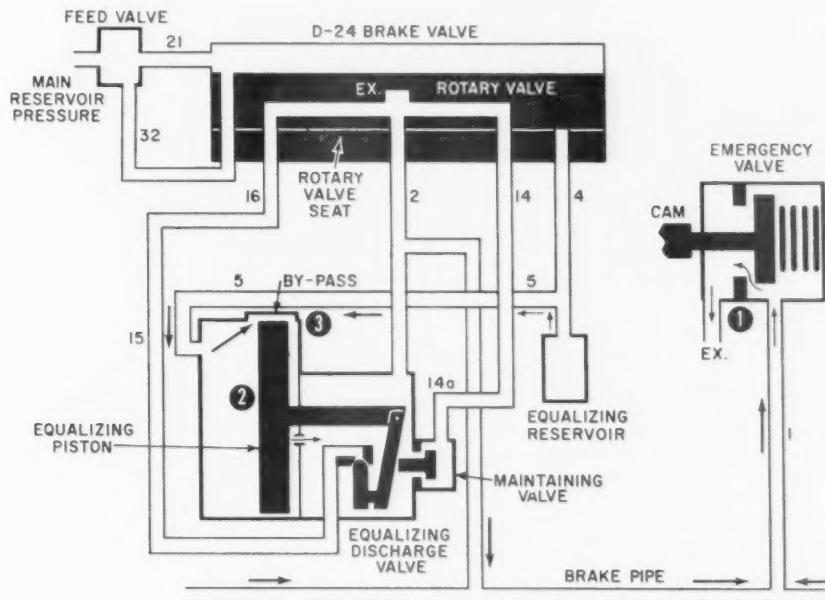
EMERGENCY Position (Sketch 13)

In the EMERGENCY position of the brake valve, the rotary valve connects the various passages as indicated in the D-24 Brake Valve position diagram. The emergency valve plunger unseats the emergency pilot valve (not shown), permitting the emergency valve to quickly unseat and provide a large, direct passage from the brake pipe to the atmosphere. An emergency rate of brake pipe reduction results. Equalizing reservoir volume is connected (by movement of the equalizing

piston to the right) through a bypass in the piston bushing, to the brake pipe volume, and then to the atmosphere.

Again with carmine, fill in the short branch marked *Main Reservoir Pressure* leading to the feed valve. Change to orange and shade the feed valve, passage 21, the area over the rotary valve, and passage 32 to the feed valve. In orange dashes, continue into passage 14a, the space behind the maintaining valve, and passage 14 to the exhaust passage in the rotary valve. Dampen and let dry.

At this point, and with yellow, color the space on both sides of the emergency valve and then to the exhaust. Fill in the area to the right of the equalizing piston, around the equalizing discharge valve, passage 2 to exhaust, proceeding to the main brake pipe, and passage 1 to the emergency valve. In yellow dashes fill passages 15 and 16 to the exhaust. Dampen and allow to dry. In light green finish off the equalizing reservoir and its connecting passages, including the chamber to the left of the equalizing piston. Dampen and let dry.



Sketch 13
EMERGENCY Position

1. The emergency valve plunger unseats the pilot valve (not shown) and the emergency valve, providing direct passage from the brake pipe to the exhaust.
2. The equalizing piston is forced to the right by the higher equalizing reservoir pressure.
3. The equalizing reservoir pressure feeds through the bypass in the piston bushing, into the brake pipe, and then to the atmosphere.

AUTOMATIC SERVICE

Position—Pressure Maintaining Feature Cut-out (Sketch 14)

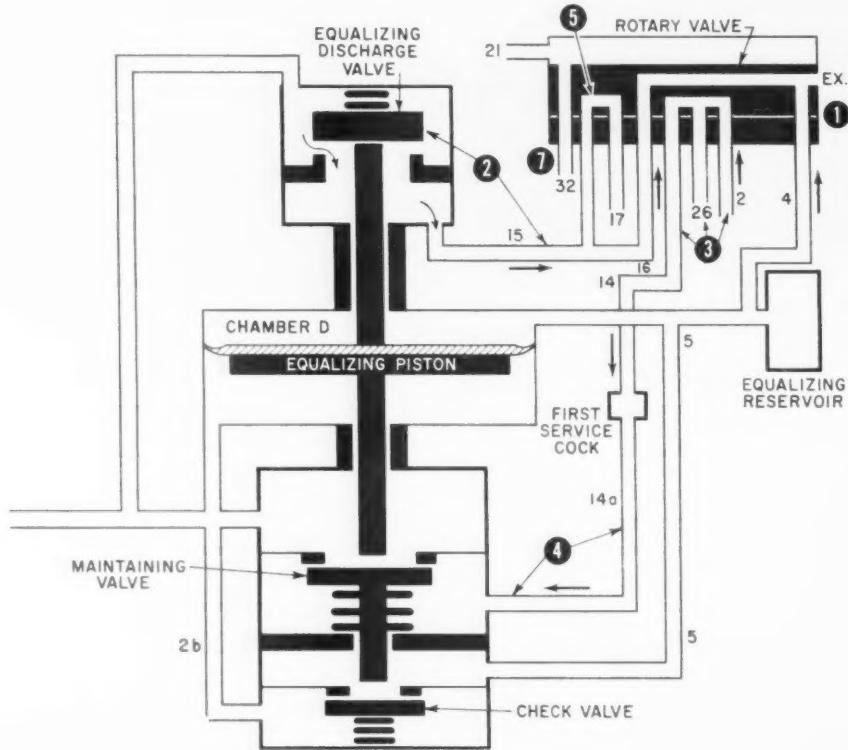
With the pressure maintaining feature cut-out, brake pipe pressure is free to flow from passage 14, (as supplied from brake pipe passage 2 through the rotary valve). This unseats the check valve in the first service cock portion and passes into passage 14a to the space under the maintaining valve. With the pressure maintaining feature cut-in (to be shown later), feed valve pressure which is higher than the brake pipe pressure at this time, will hold the check valve closed. A branch of passage 14a is connected through the maintaining cut-off valve with feed valve pressure. This flows to the

space under the maintaining valve. The pressure maintaining feature must always be cut-out when making brake pipe leakage tests.

With a yellow pencil color the space on both sides of the equalizing discharge valve, the chamber under the equalizing piston, the space above and below the maintaining valve, and the space at the bottom of the sketch beneath the check valve. Color the passages connecting the above spaces. Continue into passage 15 and then into the rotary valve, stopping at the point where the rotary valve engages its seat in passage 17. Follow passage 15 into passage 16, and then to the exhaust cavity in the rotary valve. In yellow dashes color to EX.

Again with yellow color passage 2, on into the rotary valve to passage 26, stopping where the rotary valve engages its seat. Go on through the rotary valve cavity into passage 14, through the first service cock, and into the chamber under the maintaining valve.

Switch to gray and fill passages 17 and 26. Change now to light green and begin here by shading the equalizing reservoir, following passage 4 to the exhaust passage, passage 5 to chamber D over the equalizing piston, and the chamber above the check valve (by way of passage 5). Now with orange, shade the space above the rotary valve and passages 21 and 32. Dampen and allow to dry.



Sketch 14

AUTOMATIC SERVICE

Position—Pressure Maintaining Feature Cut-out

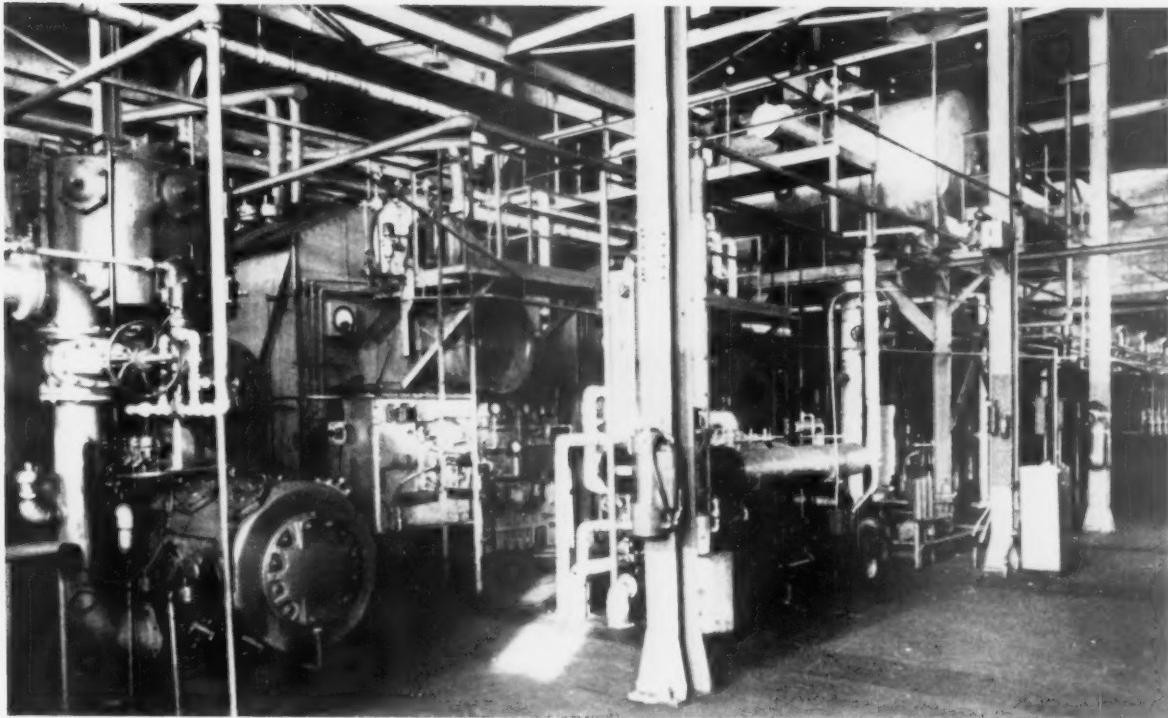
1. Equalizing reservoir and chamber D to exhaust.
2. Brake pipe to EX, via passages 15 and 16. (Reduction of equalizing reservoir pres-

sure in chamber D allows brake pipe pressure to move piston up. Piston stem unseats, equalizing the discharge valve.)

3. Brake pipe passage 2 to suppression pipe 26 and passage and pipe 14.
4. Passage 14, through the first service cock into pas-

sage 14a to the maintaining valve (closed).

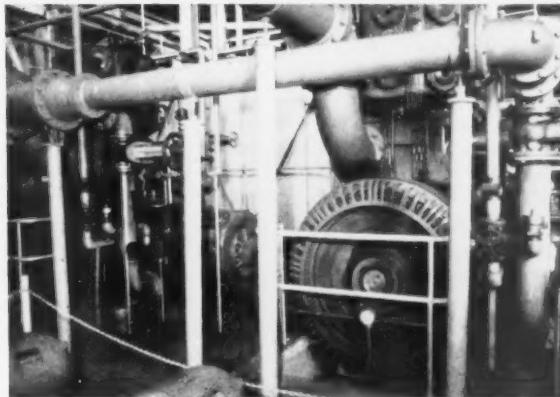
5. Passage 15 to suppression pipe 17.
6. Passages 22, 33, and 24a to EX (not shown).
7. Passage 21 from the feed valve to passage 32 to the feed valve control chamber.



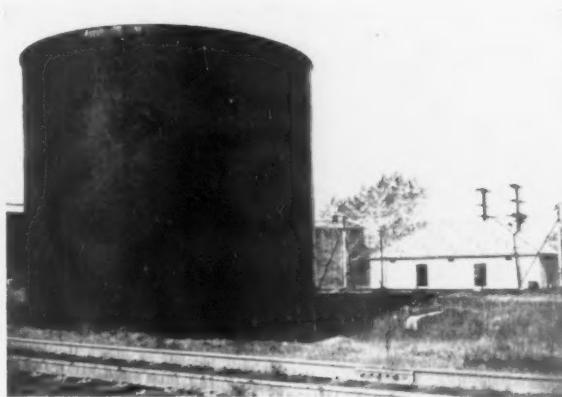
The new boiler plant and motor-driven air compressors occupy a corner of the locomotive back shop.

Lehigh Valley Cuts Power Costs 65%

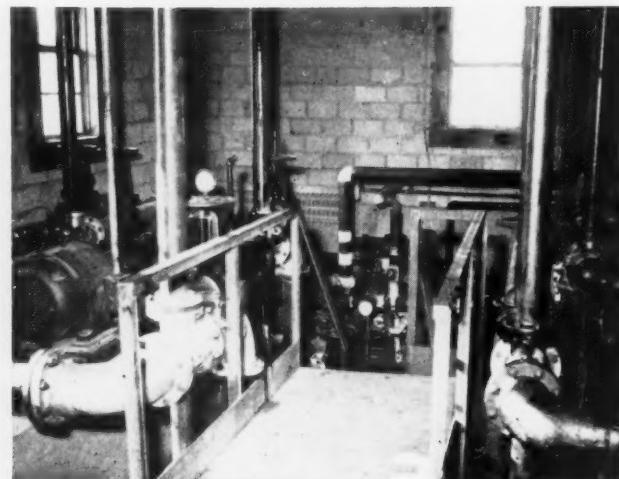
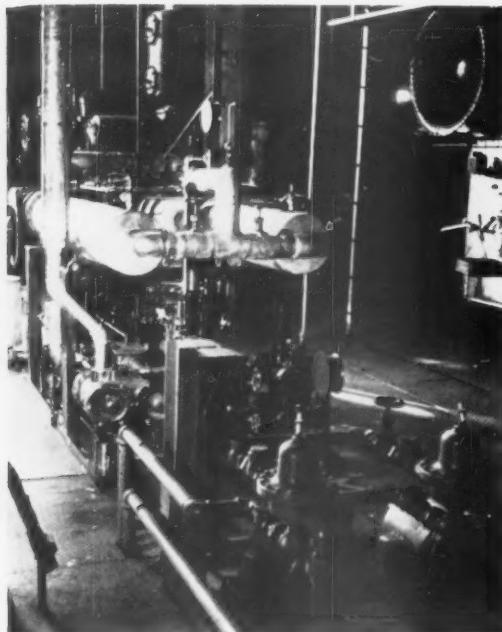
By installing a new boiler plant and purchasing electric power for all shop needs, including hammers and air compressors, the railroad will amortize an investment of \$600,000 in a little over two years



Two of the three 350-hp motor-driven air compressors which are placed beside the new boiler plant.

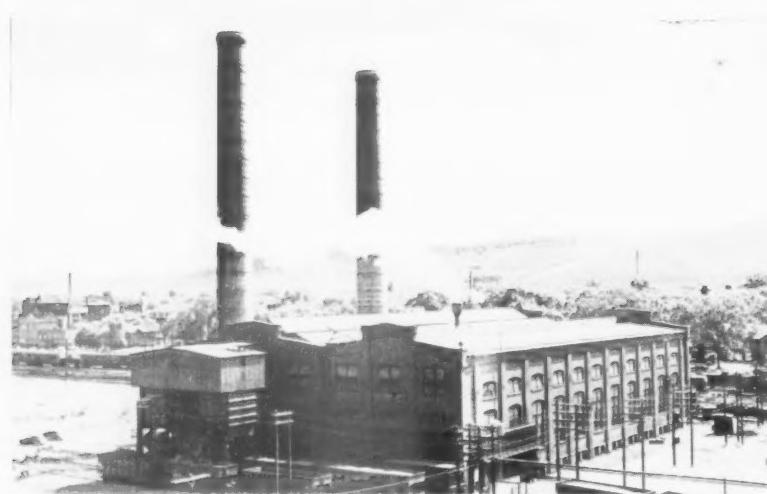


The 300,000-gal bunker C fuel tank and the oil pump house which can pump both Bunker C and diesel fuel oil.



Interior of the oil fuel pump house. It contains pumps for supplying either bunker C oil or diesel oil.

At left: The fuel pumps in the boiler plant. The two at the back normally supply bunker C oil. For starting up or for emergencies, the two in front can furnish diesel oil.



The former power plant which housed the steam-driven air-compressors and the steam-electric generators, has been abandoned. The building is now available for other railroad use or for rental.

THE LEHIGH VALLEY's power plant at Sayre, Pa., built in 1904, was abandoned in 1954, and figures are now available to show the savings made by replacing the plant with a modern boiler plant and the purchase of electric power. The total cost of new equipment installed was \$602,000, and the annual saving has been about \$270,000. Some specific figures are as follows: cost of operation of the old plant, in which electric power was generated, for December 1953, was \$44,328.67. Total cost of operation of the

new plant, including the cost of purchased power, for December 1954 was \$22,451.19. Strangely enough, the July 1953 costs of the former plant operation were \$33,321.19, and those for the July 1956 operation of the new plant were \$9,799.72. Thus, the saving at light loads is even greater than at heavy loads showing the high efficiency obtainable at light loads with the new arrangement.

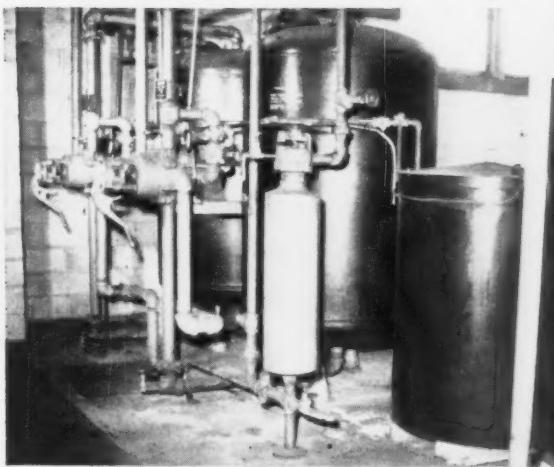
The old plant generated steam in 12 Wickes Bros. vertical, water tube boilers, totaling 3,660 boiler-

horsepower. The fuel used was anthracite buckwheat coal and it was burned on chain grate stokers. Compressed air for the shops was supplied by four horizontal compound, direct-connected, steam-driven compressors. One of the compressors was rated 5,000 cfm, one 3,000 cfm and two 1,500 cfm. Two-phase, 440-volt electric power was generated by four vertical compound engines driving three 750-kw and one 400-kw generators. Two 300-kw motor generator sets were used to supply 250-volt d-c power for cranes and variable-speed motors

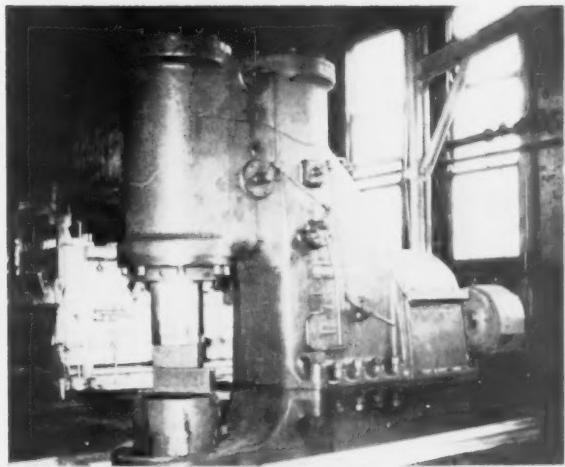
New Plant in Corner of Shop

The former boiler plant was replaced by a new one located in the southwest corner of the locomotive back shop in an area that was used for flue cleaning. Electric power is now purchased, and what were formerly steam-driven compressors and hammers are now motor-driven.

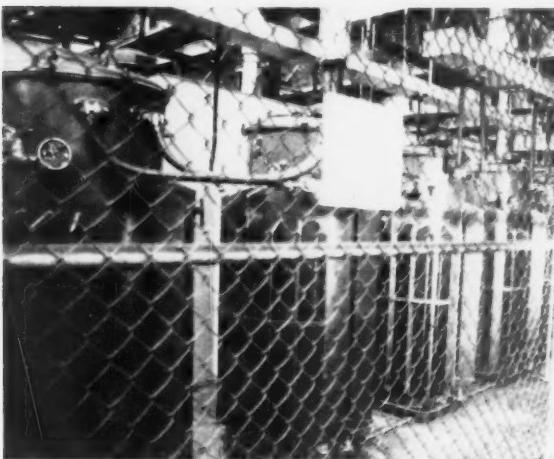
The four boilers in the new plant which generate steam at 150 lb are oil-burning CPM package-type water tube boilers, supplied by the E. Keeler Company, Williamsport, Pa. Two are rated nominally at 304 boiler hp, and two at 353 boiler hp. They are operated at 200 to 250 per cent rating with a total capacity of 3,000 boiler hp. These high ratings are made possible by Todd



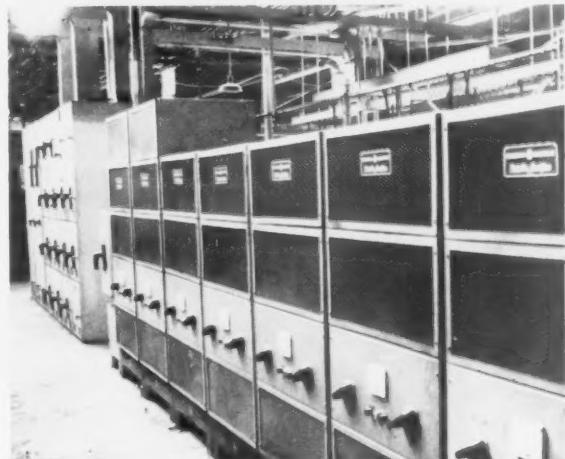
The Graver Zeolite water softener is used to condition all make-up water for boilers. At right: The 3,000-lb electric motor-driven hammer. The motor



drives an air compressor which supplies air for operating the hammer. This and a similar 500-lb hammer have eliminated the need of steam for hammer operation.



The two G-E transformers in front supply two-phase, 440-volt power, and the three behind furnish three-phase power for rectifiers.



Shop electrical circuits are controlled from the switchboard at the left. At the right are the seven 100-amp selenium rectifiers which supply 250-volt d-c power. This equipment is located on a balcony.

Shipyards Corporation oil burners which are controlled automatically by steam demand.

Fuel is bunker C oil, preheated to 180 deg F for atomization. It is supplied from a 300,000-gal storage tank, located about $\frac{1}{4}$ mile from the shop, from which the oil is pumped to a 30,000-gal storage tank adjacent to the shop. The oil line from the storage tank is heated to 110 deg F by a parallel steam line, the two being wrapped together with insulating material.

There is an oil pump house near the storage tank which is equipped to pump the bunker C oil to the day storage tank. It can also take oil from an 850,000-gal diesel fuel tank, and supply it to the boiler

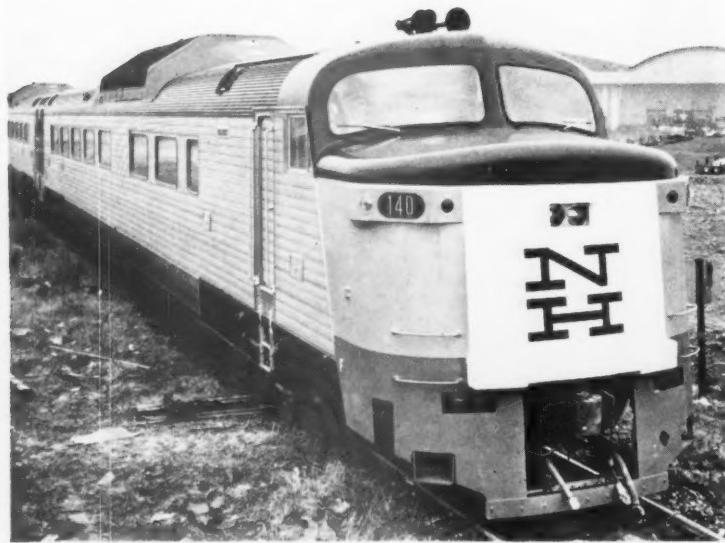
plant in case of a bunker C pump failure, or to start the plant in case of a shutdown.

Steam from the boiler plant is used for space heating, for parts cleaning including air filters and various other operations in the shop which require high-pressure, high-temperature steam. Condensate from steam used for space heating is returned to the boilers. Make-up water is treated by means of a Graver Zeolite water softener. Boiler water is preheated in a feedwater heater to a temperature between 180 and 200 deg F.

Three Ingersoll-Rand type XLE, 450-rpm electric motor-driven compound compressors, adjacent to the boilers, supply all shop air require-

ments. They are each rated 2,397 cfm, and each is driven by a Westinghouse 350-hp, 2,300-volt synchronous motor. The compressors cut in and out of service automatically, always assuring the needed supply of air, and the operation of a minimum number of compressors.

Electric power is purchased at 2,300-volts, 3-phase, and the 2-phase, 4-wire lines which supply the older motors in the shop are fed by two 167-kw General Electric 2,300/440-volt Scott-connected transformers. Three similar three-phase transformers supply power to seven 100-amp General Electric selenium rectifiers which in turn supply the 250-volt d-c lines in the shop.



A-unit RDC's are used on both ends of Budd-built New Haven train. Intermediate cars have only single vestibule and no operator's controls. One-piece, fiberglass-reinforced plastic unit forms top of the A-unit nose, windshield framing and cab roof.



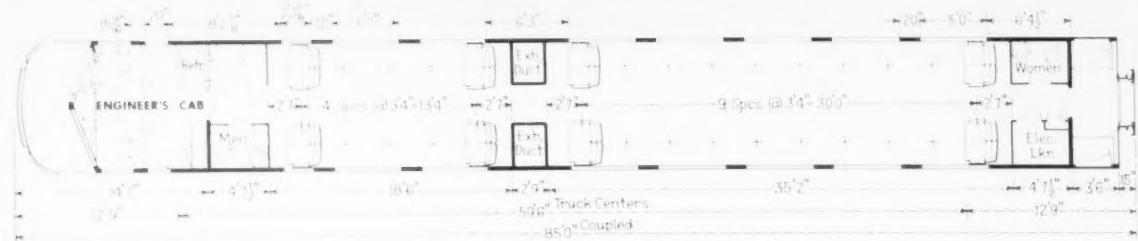
Built to operate on third-rail or diesel power, the "Roger Williams" has the highest horsepower per pound rating of any of the self-propelled lightweights

THE ROGER WILLIAMS is the most recent development in the field of lightweight, high-speed passenger trains. Built by the Budd Company for the New York, New Haven & Hartford, it is a high-speed, six-car train, consisting of two streamlined head-end units with cab control stations, and four intermediate coach units. The train may be driven by two 300-hp diesel engines on each car or from the 600-volt, third-rail by two 100-hp electric motors on each car.

The car structures are of stainless steel, light weight construction, with conventional length and floor height. The low roof accommodates an engine cooling fan and radiator enclosure and overall the train is 6 in. lower than the standard RDC. Each unit is a complete powered operating unit, with identical equipment arrangements, except for controls. Duplicate electric and diesel propulsion and Safety Genemotors are in-

◀Cars have Adlake breather-type sash units. Plymetal and aluminum wall and ceiling linings are faced with vinyl, the plywood floor is covered with Dexolum, and body is insulated throughout with Ultralite. Heating is provided through Vapor finned radiators.

Summary of a paper presented by J. E. Burton, of The Budd Company, at the Winter General Meeting of the American Institute of Electrical Engineers, held in New York, January 21-25, 1957.



A-unit car seats 60 passengers and has food service area. Intermediate cars seat 76 passengers. Seats are spaced on 40-in. centers. All cars are 85 ft long. Morton vestibules provide protected passage between cars and controls are carried through Joy trainline jumpers.

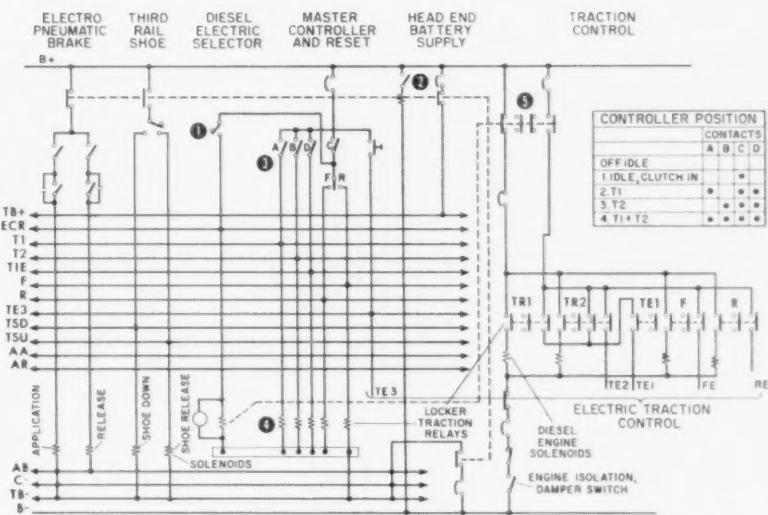
Electrical Aspects of the New Haven's Budd Dual-Powered Train

stalled underfloor at each end of each car.

Diesel power plant assemblies are mounted underfloor in a protective casing and are readily removable. Each power plant consists of a General Motors six-cylinder engine, rated 300 hp at 2,000 rpm, and a combined torque converter reverser gear assembly with torque multiplication of 3.6:1. The output shaft drives a gear unit of 1.8:1 ratio, mounted on the inboard axle of the truck. A splined universal joint shaft compensates for truck motion. All engine, transmission, and protective controls are self contained.

Electric propulsion motor gear box assemblies are nose supported on the outboard axle of each truck, and have integral supports for the disc brake and the motor to transom support rods. The General Electric motors are series-wound for 300 volts and rated 100 hp at the one-hour rating. The motors are series-connected for 600 volts and equipped with special brushes for commutator protection during extended diesel operation. The gear box ratio is 2.72:1 and it contains a ground brush and ring for journal bearing protection.

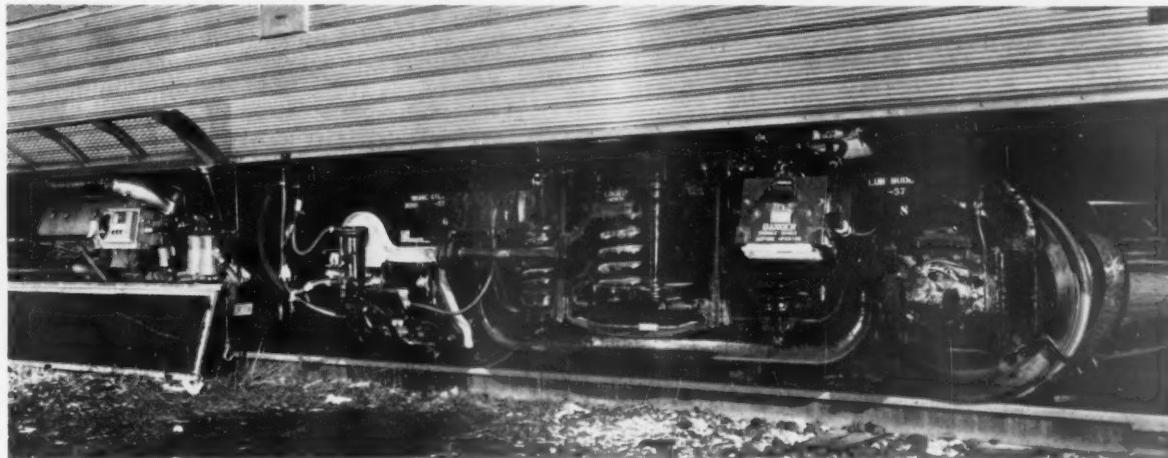
Diesel performance provides 9.0



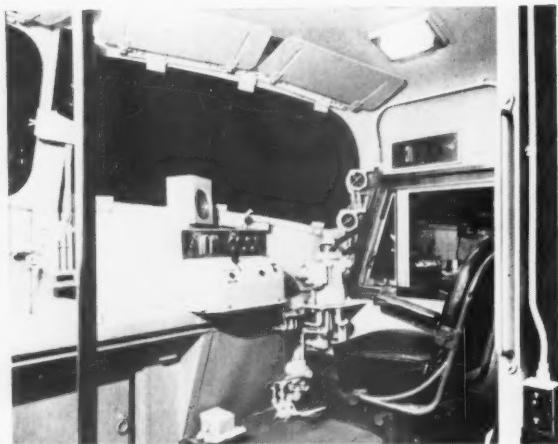
Basic head-end trainline control circuits include the following: (1) controller for diesel or electric operation, (2) isolation contactor which interrupts negative battery to all trainlined circuits, (3) selector switch for diesel or electric operation, (4) individual relays, (5) diesel engine relays.

hp/ton, based on 100 per cent of output shaft power available for traction, and 62.5 tons average light weight of cars. Initial acceleration is 1.18 mph/sec. The train accelerates from 0 to 65 mph in 2 minutes and requires only 60 per cent of power at 100 mph.

Electric performance provides 5.0 hp/ton based on short time overload rating and 62.5 tons average light weight of cars. Initial acceleration is 0.6 mph/sec. The train accelerates from 0 to 47 mph in 2 minutes and balancing speed on level track is 58 mph.



GM diesel (left) drives inboard axle of truck on which is mounted the third-rail collector shoe. Electric traction motor drives the outboard axle (right). Fluting on car sides is variation from standard Budd design. Underbody equipment is covered with deep expanded-metal skirts.



Engineman's control on "Roger Williams" includes components standard on all RDC cars, and in addition provides for operation of the train while it is being driven by the electric traction motors.

The auxiliary Genemotors are capable of supporting full standby air conditioning and light load when motor driven. When engine-driven, they are capable of supporting emergency single-engine operating loads, by reduction of air conditioning or cab heat load. The two Genemotors on each car supply the same load bus, and no provision has been found necessary for balancing the load between the two machines.

Calculated fuel consumption for round trip operation between New York and Boston, including 12 stops and 2½ hours of idling, is 190 gal per car or 2.6 miles per gal per car. Fuel tank capacity of 280 gal is provided.

Head-End Cars

The head-end cars have a large control cab station, a forward equipment compartment, and a coach section seating 60 passengers. The intermediate cars accommodate 76 passengers.

Arrangement of the electric locker, air conditioning plenum, and women's toilets at the No. 1 end of both car types allows identical equipment and wiring and underfloor installation, except in the cab.

An electric locker of the walk-in type with built in switch locker, centralizes all car controls and protection, and affords access from the aisle at the vestibule end. Switching for lighting, air conditioning or heat control, and engine start and stop, as well as cutout or traction, Genemotor, and immersion heaters, is included. Pilot light indication for

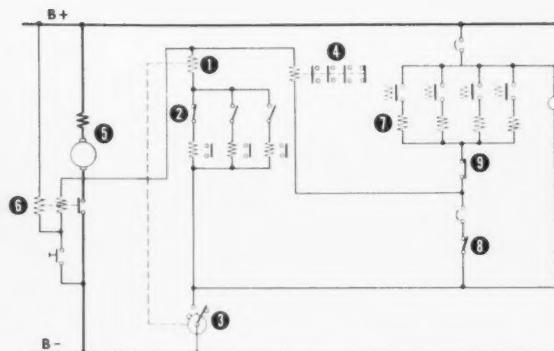
air conditioning, generator, and diesel engines is visible from the aisle.

Coach fluorescent lighting, arranged for non-thermal starters and unregulated voltage, is installed along each side of continuous multi-volt air distributors at the center of the ceiling. Individual, safety aperture type, reading lights are directed to each rotating reclining seat position.

The engineer's control station is equipped with Westinghouse M38C electro-pneumatic brake valve, a controller for electric or diesel traction; a switch panel for electric or diesel selection, third rail shoe control, electro-pneumatic cutout, No. 1 engine start, No. 2 engine start and engine stop; and a foot-operated acknowledging switch. Pilot light indication of electric traction, all engines run, and all engines stop is repeated at the fireman's station. A separate switch panel is located over the engineer's and fireman's window for control lights, signal buzzer, and electrically conductive film heated, windshield defrosters. Electric cab heaters are arranged for hi-low heat positions and reduced to low heat with loss of either generator.

Cab signal and air brake equipment is installed on structural bulkheads in front of the engineer's and fireman's station.

Trainline receptacles for a Joy 12- and a 16-wire removable, moulded jumper assembly are installed on each side of the coupler on the pilot and at each side of the coupler of all car ends for turn-around con-



Basic engine control circuits include (1) air damper shut down solenoid, (2) pressure and temperature protective switches, (3) air damper shut down limit switch, (4) engine indicating and control relay, (5) starting motor, (6) Pull in—hold in starting contactor, (7) engine and transmission operating solenoid, (8) locker engine isolation switch, (9) Remote shut down relay isolation control.

nnection and use of the RDC 12-wire jumper for emergency control.

Basic equipment and control is based on experience with RDC's in all types of service, and includes 40 RDC's on the New Haven in single and multiple operation up to five units.

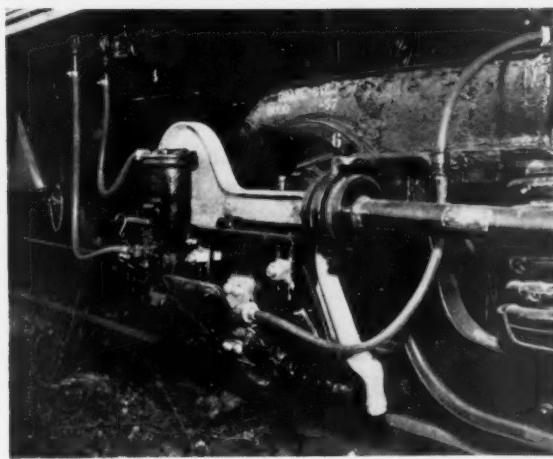
RDC equipment with modification for higher speed requires a minimum of new spare parts, procedures, and maintenance requirements. It also makes possible the use of an RDC for emergency control of the Roger Williams with automatic brake and at speeds up to 85 mph.

All Roger Williams facilities, except electric traction equipment, can be incorporated in an RDC to allow full use as a diesel-powered control unit or coach, since RDC power plants can be kit modified to include the new features.

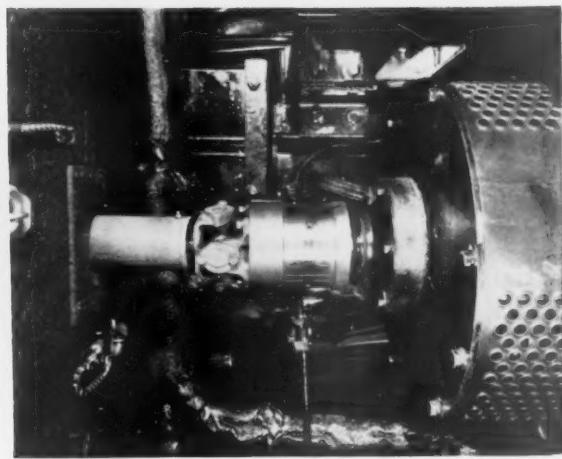
Electric traction controls and accelerating resistors are mounted opposite the No. 2 engine. The controls are of the subway transportation type with a motor driven controller. The line breaker is separately mounted adjacent to the line switch.

Flashboards on the third rail shoe mounts are specially designed of fiberglas reinforced polyester construction, and provide long leakage paths. They resiliently support the third rail shoe mechanism from one journal box on each truck except that no shoe is installed under the cab door and two shoes are installed at the opposite truck.

Auxiliary Genemotors are ar-



Third rail shoe assembly is mounted on inboard axle of General Steel Castings truck. Truck has SKF roller bearings, Standard Steel wheels and axles, Alco springs, and Fabreka sound-deadening pads.



View from pit under the car shows the flexible drive from the RDC engine (left) to Safety genemotor (right). Genemotor is driven by 600-v d-c motor when on third rail.

ranged for clutch drive from the engine front crankshaft or motor drive from the third rail supply. Each Safety Genemotor is rated 22½ kw when motor-driven and 20 kw when engine-driven. Special brushes are installed to protect the motor commutator during diesel operation.

Genemotor starting panels are located underfloor in one cabinet. In the same cabinet are circuit breakers for line protection. The control provides for low voltage cutout protection, one step unloaded starting, one step speed regulation and transfer from 22½ kw to 20 kw setting when engine-driven.

Electric Westinghouse Electric immersion heaters for 600-volt operation are installed in each engine water tank and thermostatically controlled to maintain the engines at operating temperature and supply hot water heat when the diesels are shutdown. Each heater is rated 25 kw.

Antifreeze protection and charging facilities during standby operation include (1) steam couplers and d-c charging receptacles; (2) Safety Genemotor and immersion heater; (3) idled engine and generator, when necessary.

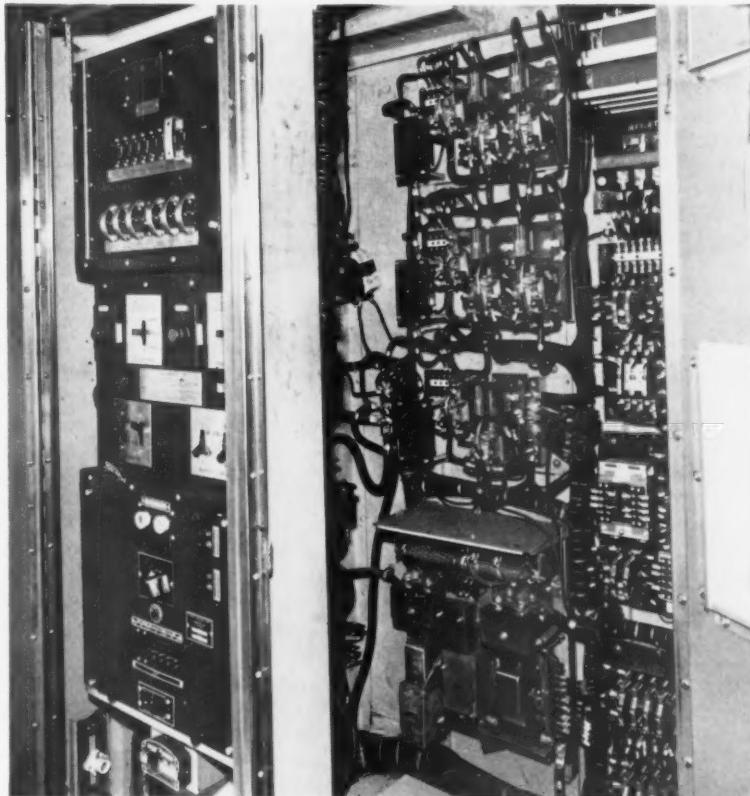
Engine starting is enhanced by (1) low cranking current due to maintaining engines at operating temperature (2) availability of generator when the second engine is cranked (3) availability of 600-volt Genemotors in third rail territory.

Third rail power circuits are confined underfloor and only 64-volt

control is extended to the car body. Open wiring is used for traction, generator, and battery cable of 1,000-volt neoprene-jacketed construction, to achieve maximum rating and adaptability to the space underfloor. Open wiring is supported and protected by special moulded

Hy-car bushings secured by strap clamps.

Basic engine control circuits operate on 64-volt unregulated supply and comprise starting, protective shutdown, fuel shutdown, indication and interlock, and clutch and throttle setting.



Electrical controls are centralized in walk-in type locker shown at right, and in the built-in switch locker left. Both open into passageway at the vestibule end of each car.

Starting is accomplished by a pull-in-hold-in solenoid contactor which closes the starter motor negative circuit, nullifies B to the air damper shutdown solenoid and, by linkage, closes the air damper shutdown limit switch and, holds the air damper open.

When lube oil reaches 12 psi, the protective low oil pressure switch opens, and the air damper remains latched open. When oil pressure reaches 17 psi, the contactor hold-in circuit is interrupted and the contactor opens the starter motor circuit.

Protective shutdown is accomplished by an air damper solenoid which is linked to the spring loaded latch which holds the damper open. During normal operation, the protective switches are open and the air damper is latched open. When any protective switch closes, it trips the air damper closed, and opens the limit switch to de-energize all controls. Overspeed causes vents to open in the oil supply of the low oil protective switch and causes engine shutdown.

Since the positive supply for the air damper solenoid is taken through the starting motor, the solenoid is de-energized during starting. It is this action which avoids tripping the damper latch before the lube oil switch opens to maintain the solenoid de-energized.

Tell-tale indication of protective

shutdown is registered by inserting a series relay in each of the protective switch circuits, and arranging a seal-in circuit to maintain pilot light indication of the circuit energized. A reset button is provided.

Cab indication of all diesels run, all diesels stop, and interlock of immersion heaters and air compressor control, is achieved by a relay connected across the air damper solenoid and protective switch circuit. All diesels run indication is obtained by a pilot light connected in series with a normally open contact on each engine relay. All diesels stop indication is achieved by a pilot light connected to a trainline wire which is energized by a normally open contact on each engine relay so that the pilot light is extinguished only when the last engine is shut down.

Isolation of traction solenoids is effected by interrupting the common negative battery circuit. An isolation switch is provided in the car lockers.

Fuel shutdown is controlled by energizing a solenoid to hold injector racks in the fuel-off position until the engine stalls and low oil pressure shutdown occurs to de-energize all controls and close the air damper. A limit switch on the fuel shutdown solenoid linkage prevents false low oil shutdown indication.

Basic head-end trainline control circuits comprise traction, electro-

pneumatic brake, third rail shoe, reset, diesel-electric selection, cab start and stop engines, and head-end battery supply to auxiliary control circuits.

All trainline circuits are supplied from the control station car battery, to avoid paralleling of batteries, and assure isolation of circuits when leaving the control station. In general, the trainline circuit operates a relay device in each car to apply local car battery to the function selected.

The controller is arranged for compatible operation for either electric or diesel control, by omission of electric traction circuits in the No. 1 idle position which is normally used for station stop and braking, to avoid unnecessary disengagement of clutches, or application of brakes against the motors.

Electric to diesel changeover is accomplished on the run by the following procedure: (1) cab start No. 1 and No. 2 engines while in electric position; (2) return controller to No. 1 idle position; (3) reduce train speed below 50 mph (below direct drive speed); (4) switch from electric to diesel and wait for clutches to engage; (5) proceed with normal diesel operation. Changeover from diesel to electric may be accomplished at any speed and followed by cab shutdown of idled engines. Locker starting of engines follows similar procedure.

From the Diesel Maintainer's Note Book

Trouble—Right in Their Hands

By Gordon Taylor

A GP-7 LOCOMOTIVE had just received an annual inspection. The engine had been carefully checked and it was found necessary to renew two cylinder and piston assemblies because of the condition of the rings and gaskets.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

After the repairs were completed, the engine was barreled over by hand operation with an engine turning jack. It was found that the engine was difficult to turn, as if there were excessive friction in the engine.

It seemed as if there were certain spots in the rotation of engine where it was more difficult to turn than at other positions.



The maintainers were very careful men and did not intend to release an engine with a binding condition. They promptly set to work to dis-

cover the cause of the trouble. They very naturally supposed there might be something wrong with the new work that had been built into the engine while undergoing repairs.

A close inspection revealed no defects that would account for a binding condition. Since it was growing late and it was time for the men to check out, it was decided to defer further efforts until next morning.

The next day some time was spent in further search of the trou-

ble. Finally someone suggested barring over another engine close by to get a comparison of turning effort. Using the same engine turning jack, it was found that the second engine was also difficult to bar over.

The next step was to try another turning jack, and it was then found that both engines could easily be barred over. The trouble turned out to be a defective engine turning jack. The cause of the trouble was right in the hands of the maintainers

while they were looking for the trouble in the engine.

In defense of the men who experienced this trouble, it should be said that they were right on the job trying to locate the cause. They are to be commended for not taking the easy course of just letting the engine go in the hope that there was nothing wrong with it. As long as maintainers continue that careful attitude, they will keep the diesels out of serious trouble.

How Much Do You Know About Brushes

How Do Rubbing Speed and Spring Pressure Affect Brush Performance?

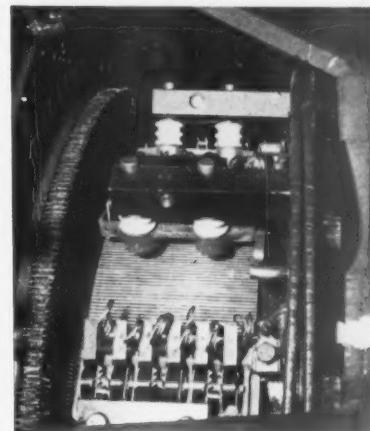
TO A LIMITED EXTENT, the effects of rubbing speed and spring pressure on brush performance are interdependent. All brushes have a maximum efficient operating rubbing speed limitation, other conditions remaining constant. This maximum will vary, for a given grade, with any change in the operating conditions. Spring pressure is one of these conditions. Temperature, current density, and atmospheric conditions are other variables.

When the maximum rubbing speed at the given conditions is exceeded, the result may be (1) short brush life, sometimes called dusting, (2) poor commutation as evidenced by heavy sparking and burned commutator bars, and (3) high brush friction attended by film stripping. In all fairness, it must be agreed that the first two of these difficulties may also be tied in with the riding characteristics of the brush. Spring pressure plays its part in that the brush riding characteristics and the contact-drop level can be changed by changing the pressure.

A brush grade may have been doing a good job under present conditions but if the conditions are

changed for operating reasons the brush may get into trouble. For instance, let us assume that grade X has a nominal maximum rubbing speed of 9,000 ft per minute, roughly equivalent to the conditions obtained on a motor at 65 mph with a 65-mph gear ratio in use. Assume now that it is found desirable to operate these units at 75 mph. Unless this speed obtains for only short distances, the brush grade will certainly be in trouble. At 75 mph, the rubbing speed will have been increased to approximately 11,000 ft per minute. Changing the spring pressure would not be indicated in this case. Two recourses would be: (1) assuming the motor will withstand the increased speed, change to a brush grade capable of operating under the higher speed, or (2) change the gear ratio to keep the commutator speed at the same 9,000 ft per minute rubbing speed at 75 mph.

Brush spring pressure of itself, for a given type of traction motor, has a rather wide range in which satisfactory operation can be obtained. The range is much less for generators. However, long experience by the electrical and brush manufacturers has developed certain optimum ranges. These should be strictly observed unless some peculiarity of



operating conditions is found to create a specific case where the need for a change in brush spring pressure is indicated. On diesel locomotives, the specified ranges are normally adequate to handle all operating conditions. If the spring pressure is too high, it will result in (1) commutator wear, (2) reduced brush life, and (3) film stripping because of excessive brush friction. If the pressure is too low, it will result in (1) poor brush riding, (2) adverse commutator condition, and (3) flashovers due to brushes bouncing and propagating the flash from ring-fire.

It should be kept in mind that approval of a given brush grade for use on a machine has been based on test results which were obtained under standardized spring pressure conditions. Tampering with the specified brush spring pressure should not be accepted as a means of improving brush performance until it has been definitely established that the problem is not arising from the use of an inadequate brush grade.

BY K. R. MATT
National Carbon Company

This is the third of a series of questions and answers which are appearing each month.

QUESTIONS and ANSWERS

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F536-Q—What other braking medium is available during dynamic braking?

A—The independent brake is always available.

F537-Q—Even though it is available, should the independent brake be used during dynamic braking?

A—The independent air should always be kept released during dynamic braking, or the wheels may slide.

F538-Q—May the automatic brake be used on the train during dynamic braking?

A—Yes

F539-Q—If a unit is isolated so that its dynamic brake is inoperative while the rest of the locomotive is in dynamic braking, will the automatic brakes on that unit apply?

A—The automatic brake on the isolated unit will not apply.

F540-Q—Explain the reason.

A—The dynamic interlock on that unit, even though isolated, remains energized as long as the engineer is operating in dynamic braking.

F541-Q—What causes the dynamic interlock to be energized?

A—The dynamic interlocks on all units are energized by the engineer's selector handle.

F542-Q—In the event of a brake valve initiated emergency brake applications, how is the operation of dynamic braking affected?

A—The dynamic brake is automatically nullified and the locomotive automatic brakes will apply.

F543-Q—What must be done to recapture the dynamic brake?

A—The selector handle must be returned to the No. 1 position and then to off.

F544-Q—How is braking effort affected as speed decreases?

A—As the speed decreases, braking effort builds up to a maximum near the locomotive continuous speed and then decreases at a sharp rate.

F545-Q—At what speed is dynamic brake still effective?

A—There is still considerable braking left at 10 mph, and often this is more effective than the independent brake.

F546-Q—What performances may not be expected of the dynamic brake?

A—It must not be expected to stop heavy trains in short distances or to slow trains down on heavy grades.

F547-Q—At low speeds, does the dynamic braking effort fall?

A—Yes, the dynamic braking effort decreases sharply.

Bulletin 1706, Sec. 110-A, Page 3.

F548-Q—What should be done when speed is around 5 mph?

A—Release the dynamic brake by moving the selector lever to No. 1 position and applying the independent brake to keep the slack from running out.

Manipulating Dynamic Brake on Level Track

F549-Q—What happens when maximum braking slows the train?

A—The ammeter pointer falls back as train speed drops.

F550-Q—What must be done to maintain the maximum braking?

A—The selector lever (handle) must be moved to the right to keep the pointer at the upper end of the white zone.

F551-Q—What manner of manipulation should be employed if a steady speed is desired, rather than a slow down?

A—Ease off by moving the handle to the left until the required speed is reached.

F552-Q—How can the speed be held?

A—To hold this speed, move the handle forward to retard or back to accelerate.

F553-Q—Is the dynamic brake intended for use in bringing the train to a stop?

A—No.

F554-Q—What would you say as to the general use of the dynamic brake?

A—If the distance available for the stop is sufficient, and it is desired to avoid an automatic air application for some particular reason, the train may be slowed down gradually with the dynamic brake.

6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

Pamphlet 5046-15 Page 41

W218-Q—How long do the movable parts of the distributing valve remain in the position shown?

A—Until brake cylinder pressure slightly exceeds application cylinder pressure, when the application piston and application valve move back to Lap.

W219-Q—How is release after emergency brought about?

A—By the same manipulation of the automatic brake valve as that following service application and is explained under "Release and Recharge".

W220-Q—What should be done following an emergency application from an emergency brake valve, burst hose or parting of the train?

A—The handle of the automatic brake valve should immediately be moved to Lap position to prevent a loss of main reservoir pressure.

Independent Brake Operation

W221-Q—How can the air pressure in application be controlled?

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THE WINE RAILWAY APPLIANCE CO., TOLEDO 9, OHIO

QUESTIONS AND ANSWERS

A—This pressure may be controlled indirectly by the automatic portion of the brake valve or directly by the independent portion of the brake valve.

W222-Q—What must be considered when using the independent portion of the brake valve?

A—Although the equalizing portion of the distributing valve can be disregarded, the application piston must be considered as being moved by the air in the application cylinder, controlled directly by the independent portion of the brake valve.

Running Position (Plate 1)

W223-Q—When is Running position of the independent brake valve used?

A—This is the position in which the handle of the independent brake valve should be carried at all times when the independent brake is not in use.

W224-Q—What ports in the independent brake valve are connected in the Running position?

A—Exhaust valve 134 is open, connecting ports 19 and 4.

W225-Q—What communications are established?

A—Communication is established through the distributing valve release pipe, between the application cylinder and EX of the automatic brake valve.

W226-Q—How are the locomotive brake cylinders connected at this time?

A—The brake cylinder pipe is open to atmosphere through ports c, d and e in the distributing valve.

Application, First Stage (Plate 6)

W227-Q—How is an independent application of the brakes obtained?

A—The independent brake valve handle is moved to the right, the farther the movement the greater the amount of application.

W228-Q—What action takes place as the handle is moved to the right?

A—The cam on shaft 76 moves dog 144, pusher pin 139, and attached levers, the ends of which are positioned on inlet valve 122 and exhaust valve 134.

Pamphlet 5046-15 (Page 42)

W229-Q—In view of the above, what is accomplished by the first movement of the handle cam?

A—The first movement of the handle cam causes the exhaust valve to close, cutting off the brake valve exhaust.

W230-Q—What takes place with further brake valve handle movement?

A—Further movement of the brake valve handle to the right causes additional movement of the balancing levers, which now pivot on the closed exhaust valve, and open the inlet valve.

W231-Q—What flow of air now takes place at the brake valve?

A—Main reservoir air flows from passage 7 into brake valve chamber F, supplying application air past check valve 97b and through passage 2 to the application cylinder pipe. At the same time, application air flows from chamber F to passage 4 and the distributing valve release pipe.

W232-Q—Describe the flow of air at the distributing valve.

A—Air from the application cylinder pipe 2 flows through passage 2 to the application cylinder and through cavity k and port w to the application chamber. Air from the distributing valve release pipe flows through passage 4 and cavity k in the equalizing slide valve to port w and the application chamber.

General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Setting PC Switch.

G606-Q—What power and speed is available if the PC switch is tripped?

A—Locomotive will have power in the number one throttle position (shown on load indicating meter) but engine speed will not advance as the throttle is opened.

G607-Q—Will the fuel pumps continue to operate?

A—No, the fuel pumps will be stopped.

Manual 2310, Page 226.

G608-Q—What would be the situation in No. 5 or 6 throttle position?

A—The engines will stop; no bells will ring.

G609-Q—What will cause the same trouble as a tripped PC switch?

A—A condition in which the fuel pump switch in the cab is out, and the fuel pump fuse in the distribution panel is blown.

Ground Relay

G610-Q—How does the pointer indicate the position of the ground relay?

A—The pointer points to a yellow dot when set, and to a red dot when tripped.

G611-Q—What are the conditions when the ground relay is tripped?

A—The engine will not speed up when throttle is opened, and in No. 5 or 6 position of throttle the engine will stop and the blue lights will light.

G612-Q—What must be done to reset the ground relay?

A—to reset: isolate the engine, reset the relay and put the engine on the line.

G613-Q—What should be done if relay continues to trip?

A—Isolate the unit. (See Article 316 in the manual).

Wheel Slip Control

G614-Q—What happens if wheel slipping occurs?

A—the wheel slip control, located in the electrical control cabinet behind the power contactors, will operate.

G615-Q—What is the indication of a wheel slip?

A—the wheel slip indicator on the engineer's instrument panel will light.

G616-Q—What does wheel slip action accomplish?

A—it automatically reduces the power output of the main generator, which in turn reduces traction motor torque, stopping the slipping.

G617-Q—Is it generally necessary to reduce the throttle when momentary wheel slip action occurs?

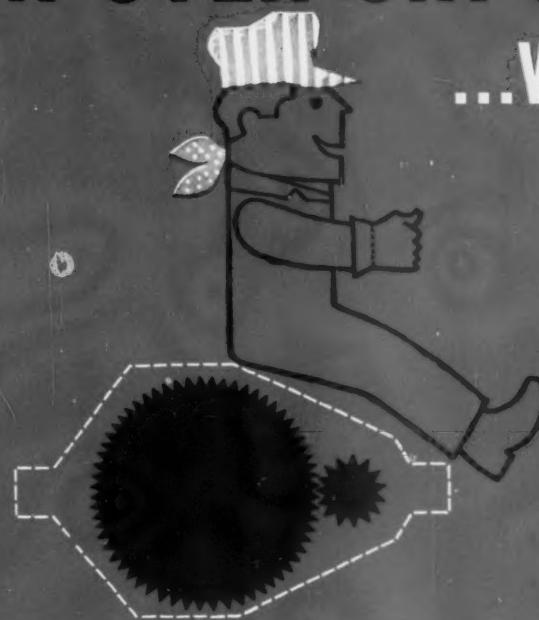
A—No.

G618-Q—Explain the reason.

A—the locomotive will automatically reduce its power to stop the slipping.

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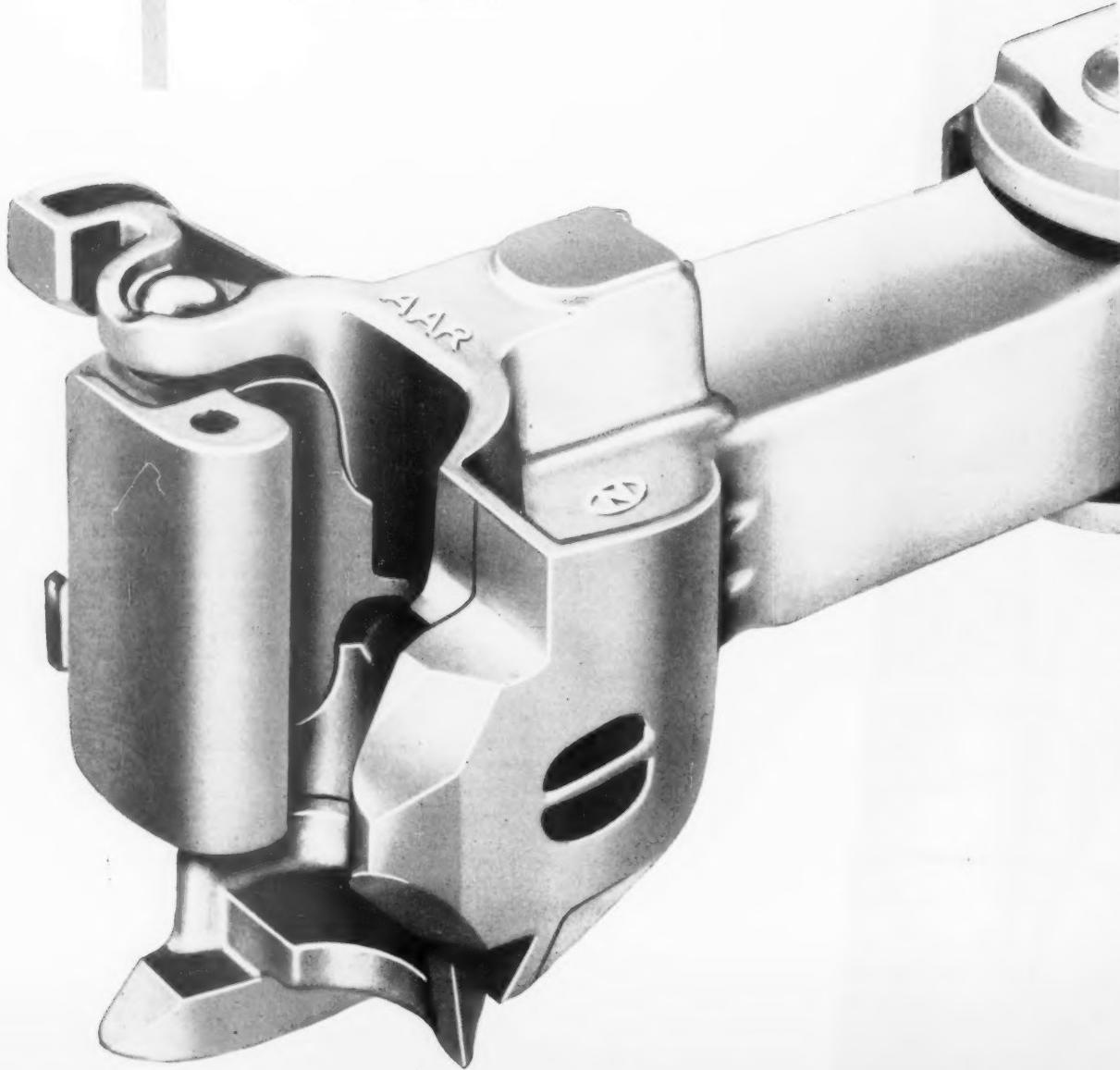


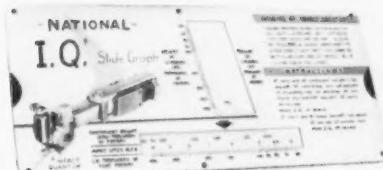
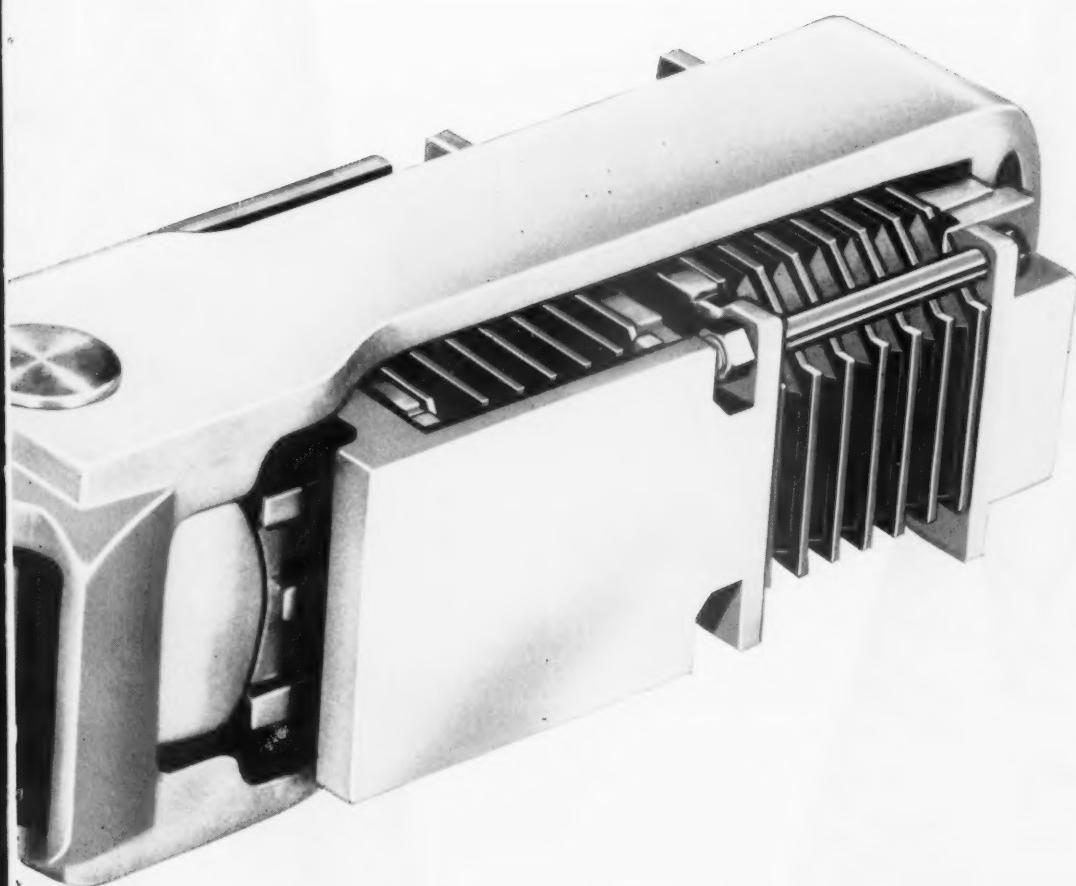
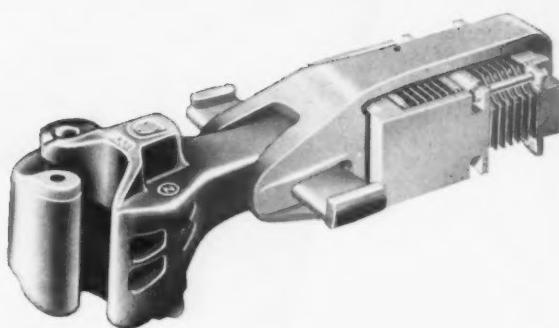
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National Specialties*

REASON:

National's MF-400 Rubber-Cushioned Draft Gears have a rated capacity of 42,500 foot pounds, *plus* a reserve capacity 54 per cent greater than the rated—*65,500 foot-pounds!* This reserve capacity guarantees the original rated capacity at the original force level over a longer period of time than possible with gears that have definite solid points at their rated travel.





NATIONAL'S I.Q. SLIDE GRAPH
(Available upon request)

Shows total work done in foot-pounds during impacts between various cars at various speeds! Shows how much of this work National Draft Gears account for at various force levels! Points up need for high capacity in draft gears!

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Established 1868

Cleveland 6, Ohio

COUPLERS
YOKES
DRAFT GEARS
FREIGHT TRUCKS
SNUBBER PACKAGES
JOURNAL BOXES



EQUIPMENT

(Continued from page 16)

It is applied conventionally and is used either with a normal drying before coating with plastisol, or a pre-bake with the primer. The resulting bond is intended to withstand any tooling operation in addition to extremes of temperature, humidity, and most mild acid or alkaline solutions. *Dept. NS, Compo Chemical Company, Dept. RLC, 125 Roberts Rd., Waltham 54, Mass.*



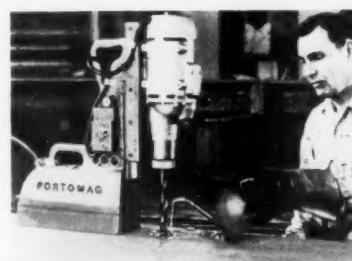
Fluorescent Lighting

A fluorescent luminaire designed specifically for tunnel and underpass lighting is now available. Named Form 106U,

the 6-ft. single-lamp unit is designed to produce adequate lateral illumination for sidewalls and ceilings as well as to effectively direct the desired amount of light on the roadway.

It has a one-piece extruded acrylic plastic globe that has been scalloped to provide the proper diffusion of light. Both the globe and the alzak aluminum reflector are side-hinged for easy access to lamps, ballasts, and wiring. Spring-loaded sockets provide easy relamping when necessary. An extruded aluminum hood and die-cast aluminum end plates provide for reduced maintenance and easier handling.

The luminaire is equipped with adjustable-angle galvanized steel mounting brackets and resilient gasketing and material between the hood and globe. A choice of lamps,—Slimline 72T8 (300 ma), Slimline 72T12 (600 ma), and Rapid Start F7T12/CW/RS,—is available. Another feature of the unit is economical ballasting which is achieved by the use of luminaires with two-lamp ballasts in conjunction with ballastless luminaires in multiple luminaire installations. *General Electric Company, Dept. RLC, Schenectady 5, N. Y.*



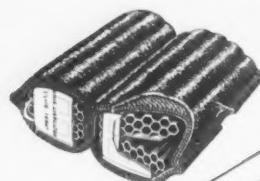
Automatic Power Feed

Automatic power feed has been added to the Portomag drill press. It is now possible to take this machine to the job, eliminating waste time and production tie-ups when taking work to a radial drill.

While the electro-magnetic base holds the drill press in position, the new power feed makes it possible for the operator to run the drill point down to the center punch mark, turn on the automatic feed, and let the drill do the work. The power feed can be engaged or disengaged at any time, and the depth of cut per

(Continued on page 82)

**78,000 CARSETS
TO DATE**



FOR PROGRESSIVE RAILROADING



This ultra-modern manufacturing facility (40,000 sq. ft.) has been completed and occupied on a 6½ acre site acquired in Winona for volume production of Miller Center Feed pad lubricators.

Additional production capacity is now on hand to meet every railroad requirement placed with us, regardless of amount.

- Volume quantities—immediate delivery
- Cost—\$40 per carset (for all sizes)
- Life expectancy—6 years

MILLER LUBRICATOR CO., WINONA, MINN.

Another addition to full line standardization

the new

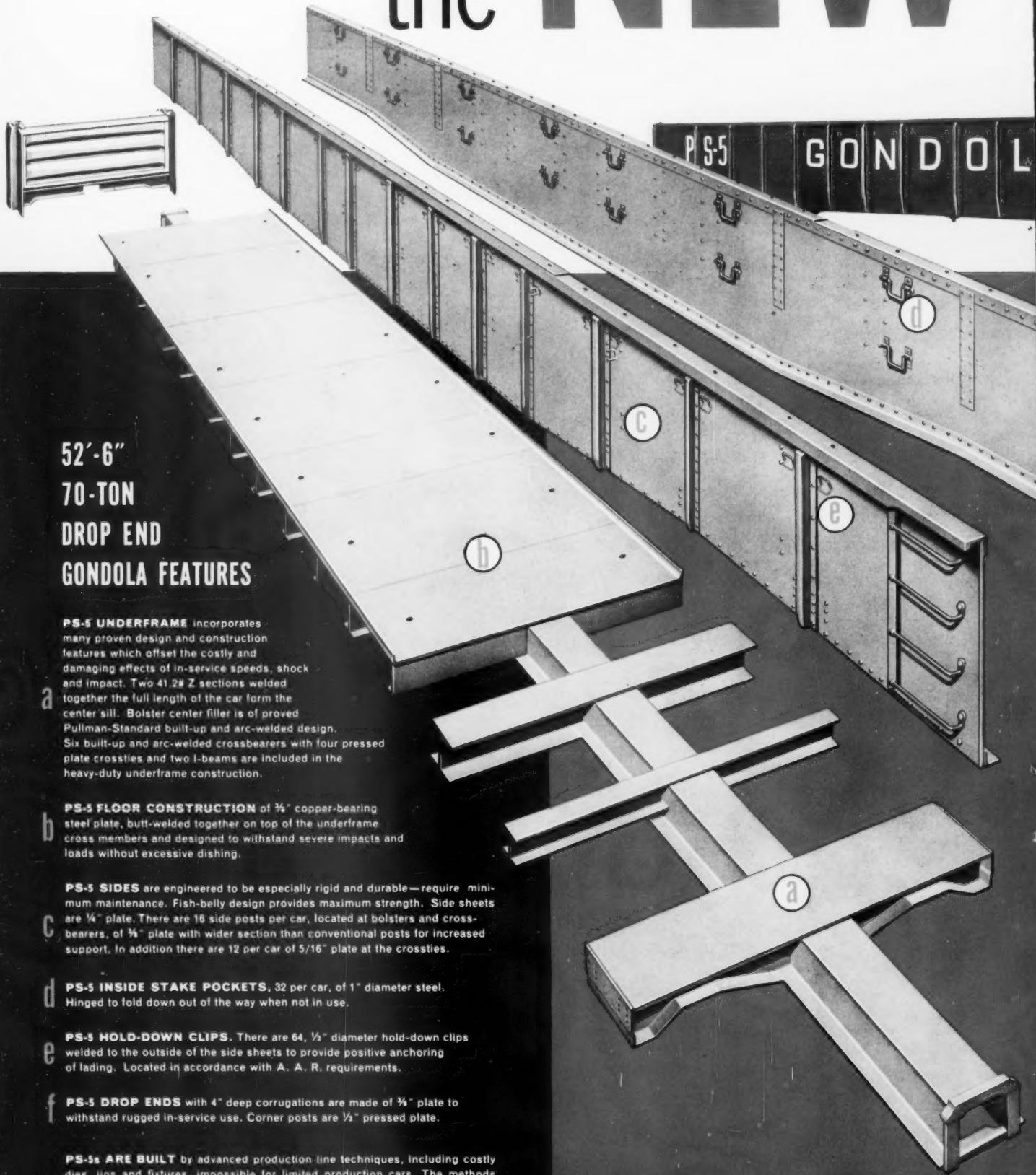
PULLMAN-STANDARD

PS-5

gondola

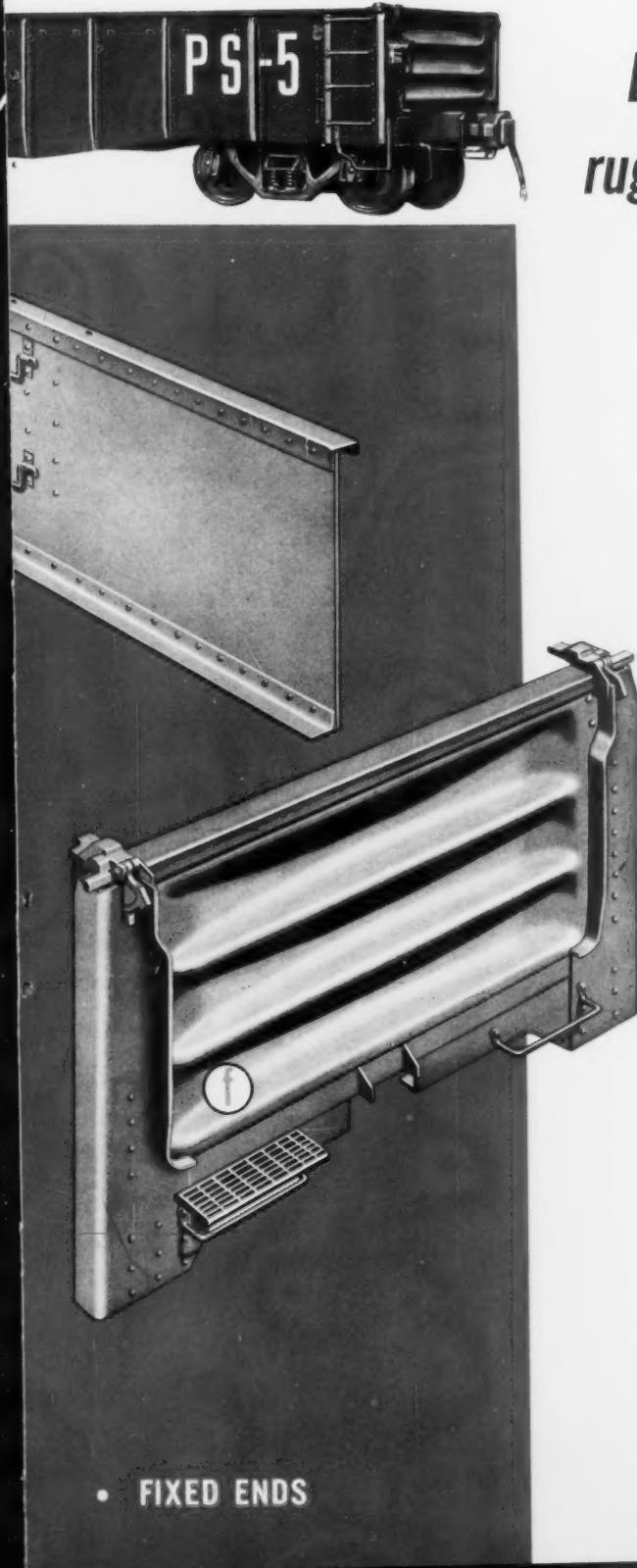


the NEW



• 52'-6" • 65'-6" • DROP ENDS

PS-5 GONDOLA



*EVOLVED from 8 years'
rugged service on the FRISCO
and 3 years on the Rock Island*

Development of the new, standardized PS-5 Gondola resulted from exhaustive design and engineering collaboration between the St. Louis-San Francisco Railroad, the Rock Island and the world's leading carbuilder, Pullman-Standard. This cooperative effort spanned many months . . . existing rolling stock was studied, areas for improvement were probed, the effects of current car handling practices were investigated and potential trouble spots were eliminated. The Pullman-Standard concept of *flexible* standardization was the thread that wove these studies together . . . standardization that would allow Pullman-Standard to apply the economies and quality controls of mass production to the building of these cars while providing sufficient design versatility to meet the varied use requirements of owners and shippers. Finally, a design was developed that would meet the hard in-service demands made on gondolas by the Great American Railway System.

This advanced design was built into four hundred 52'-6" gondolas which rolled off the production line in 1949 for the Frisco. 1953 saw the first of three hundred 65'-6" gondolas, built to this same basic design, delivered to the Rock Island. Now eight years of punishing service are behind the Frisco's original lot of gondolas while the Rock Island units are in their fourth year.

This service-proved gondola design has now been further refined through Pullman-Standard's flexible standardization concept, and the gondola, the PS-5, has been added to the Pullman-Standard family of standardized freight cars.

Railroad purchasers of the PS-5 now receive all the plus advantages of Pullman-Standard standardization . . . thoroughly proved design, mass production economies and consistent superior craftsmanship applied through the carbuilding experience and know-how of the world's largest carbuilder.

Complete specifications detailing the new PS-5 standardized gondola are available from your Pullman-Standard representative. Call him—he will be pleased to discuss this new car with you and show you how an investment in the PS-5 means lower first cost, more dependable performance, minimum maintenance and railroad-shipper acceptance.

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY, Subsidiary of Pullman Incorporated
221 N. LA SALLE STREET, CHICAGO 1, ILLINOIS
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

• FIXED ENDS

PS-5

specifications*

General Dimensions

P-S Standardization

Provides Flexibility in Basic PS-5 Design

Pullman-Standard's concept of standardization allows sufficient flexibility for P-S engineers to work with buyers in adapting the PS-5 to special requirements. Typical options you may specify:

length Either 52'-6" or 65'-6" lengths are available.

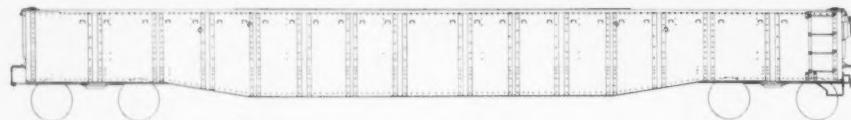
sides Side heights can be provided to suit your requirements.

floors PS-5 Standardized Gondolas can be provided with floors of welded steel, P-S Nailable Steel Floor, wood or a composite of wood and steel.

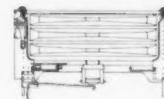
ends Either drop or fixed ends are available on the new PS-5.

	52'-6" 70-Ton Drop End Gondola	65'-6" 70-Ton Mill Type Drop End Gondola
Length inside	52'-6"	65'-6"
Length over strikers	54'-6"	67'-6"
Length between trucks	43'-6"	56'-6"
Width inside	9'-6"	7'-9"
Inside height	3'-6"	3'-6"
Inside stake pockets	Thirty-two collapsible inside stake pockets per car.	Forty collapsible inside stake pockets per car.
Hold-down clips	Sixty-four per car	Eighty per car
Drop ends	Drop ends of $\frac{3}{8}$ " plate, Pullman-Standard design with 4" deep corrugations.	Drop ends of $\frac{3}{8}$ " plate, Pullman-Standard design with 4" deep corrugations.

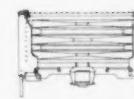
*Specifications subject to change without notice.



52'-6" PS-5 Gondola



65'-6" PS-5 Gondola



WORLD'S LARGEST CARBUILDER

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

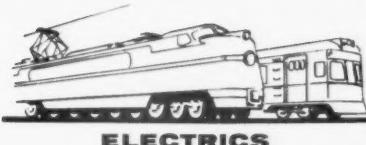
221 NORTH LA SALLE STREET, CHICAGO 1, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON





DIESELS



ELECTRICS



MU CARS

ALL

can have

EXTRA, TROUBLE-FREE MILEAGE with Magnus traction motor support bearings

EVERY make and model of diesel-electric and electric locomotives or MU cars ever built can take advantage of the extra precision and trouble-free performance of genuine Magnus HIGH MILEAGE traction motor support bearings. These super-precision replacement bearings, designed and built by bearing specialists, can be obtained by any Railroad directly from Magnus Metal Corporation.

Each of the features at the right makes an important contribution to that extra safety factor found only in Magnus traction motor support bearings. And the present-day trend to higher mileage between motor overhauls call for this added cushion against costly breakdowns.

What's more, Magnus high-speed, high-precision production methods can manufacture these bearings so economically that relining or rebuilding is both unnecessary and impractical.

For the complete story on Magnus HIGH-MILEAGE traction motor support bearings, write for your free copy of Bulletin No. 6000, Magnus Metal Corporation, 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 6, Ill.



FEATURES

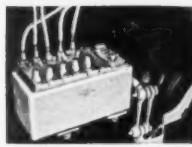
1. Perfectly mated bearing halves
2. Heat-resistant Satco lining metal
3. Interchangeable double keeway
4. High strength brass backs
5. Improved flange fillet profile — no "feathering," no "riding."
6. Precision finish boring to extremely close tolerances.

MAGNUS

High Mileage

TRACTION MOTOR SUPPORT BEARINGS

OTHER MAGNUS PRODUCTS FOR DIESEL LOCOMOTIVES



Wheel Flange
Lubricators

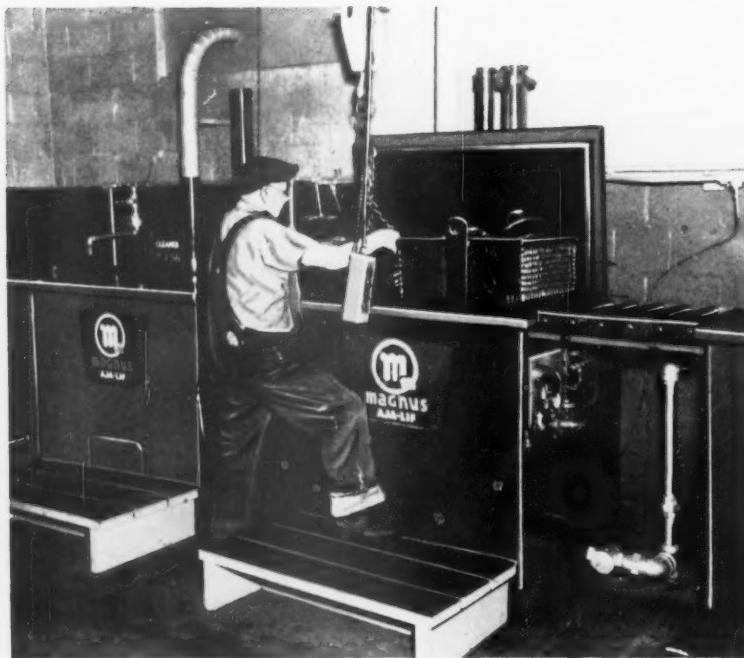


Safety
Valves



Fuel
Tank
Sight Gages

MAGNUS METAL CORPORATION Subsidiary of **NATIONAL LEAD COMPANY**



A NEW METHOD FOR... PRODUCTION LINE CLEANING OF JOURNAL BOXES & BEARINGS!

One cleaning shop of a major railroad was falling behind in its journal box and bearing cleaning . . .

It is now ahead of schedule!

It formerly employed two mechanics and two men handwashing parts . . .

It now employs three mechanics—no hand labor!

THE REASON: A MAGNUS METHOD

With the utilization of Magnus machines, materials and methods, production-line cleaning efficiency was achieved. Boxes go into one heated Magnus Aja-Lif machine and are automatically agitated for 12 to 15 minutes in a heavy duty soap type alkaline cleaner.

Bearings go into an unheated Aja-Lif containing Magnus RR-755 with solvent seal, and then, by a roller conveyor to a second unheated Aja-Lif containing safety solvent.

The result: Boxes and bearings are *efficiently and thoroughly cleaned*.

For information on how Magnus can bring production-line efficiency to your cleaning, write Magnus, 77 South Avenue, Garwood, New Jersey.



RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.

— a world-wide organization specializing in cleaning and protection of all surfaces.

EQUIPMENT

(Continued from page 76)

revolution can be set according to the size of drill bit used.

This machine will drill up to 1 1/4-in. and tap 1-in. holes with accuracy, completely eliminating operator fatigue. Portomag, Inc., Dept. RLC, 1511 East Nine Mile Road, Ferndale 20, Mich.



Paint Mixer

The Jiffy Mixer is said to shorten the mixing time and obtain more thorough and smoother paint mixes. It is also said to be a time saver for, among others, aluminum and lead based paints, powders, and latex. Mixing is reported so complete that straining is unnecessary.

It can be rotated by any standard electric or pneumatic portable power tool in any open container without splashing or cutting into the container wall. Air cannot be sucked into the mixture, according to the manufacturers, and being it is not clamped to the container, the operator separates all solids from the sides and bottom by manual movement of the device. Jiffy Mixer Co., Inc., Dept. RLC, 515 Market st., San Francisco 5.

High-Temperature Insulating Material

An organic modified-silicone insulation approaching the heat resistant requirement.
(Continued on page 86)

MOTOR WHEEL ANNOUNCES

Improved Longer Service **PRESSED STEEL** Journal Box Lids

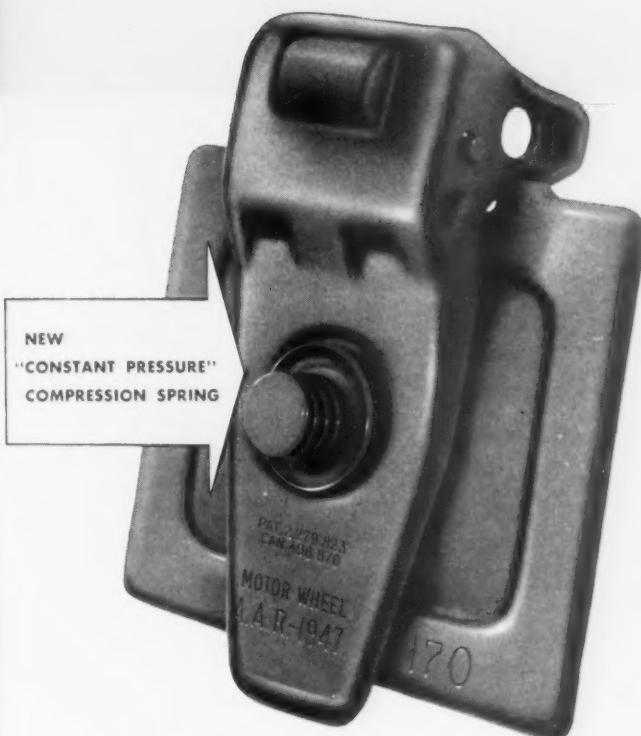
NEW

"CONSTANT PRESSURE" COMPRESSION SPRING

- HAS GREATER RANGE OF DEFLECTION
- PROVIDES GREATER SURFACE CONTACT
- INCREASES LID LIFE

Motor Wheel's improved coil spring center construction provides constant pressure over a greater seating surface on the housing. Service tests have proven that this improved assembly increases lid life.

Motor Wheel lids provide 4-way articulation . . . extended housing arms to facilitate raising lid . . . 120° opening for service . . . installation or removal without tools . . . and rugged, pressed steel construction.



Certified by A.A.R. to latest Spec. M-120-47

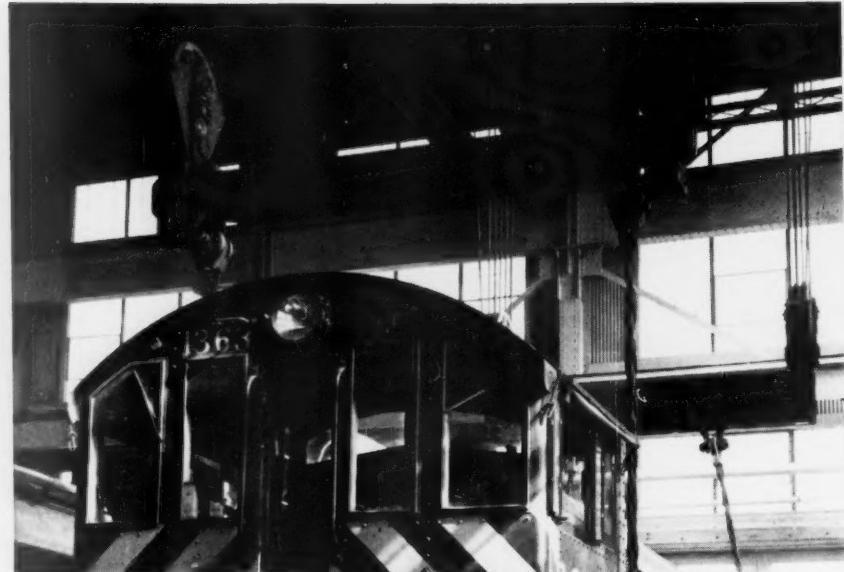
**MOTOR WHEEL
CORPORATION**

LANSING 3, MICHIGAN



National Railway Sales Representatives
T-Z RAILWAY EQUIPMENT CO.
G. S. TURNER, President
8 South Michigan, Chicago 3, Ill.

Name
the load
on your
road

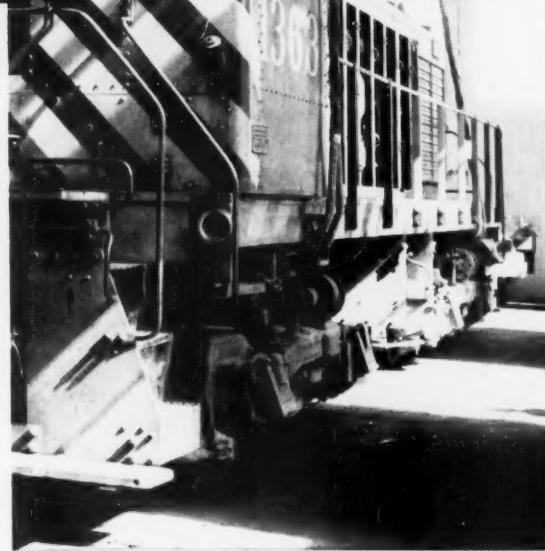


there's a
Yellow Strand[®]
**Safety Sling to
handle it!**

Any load you have to handle is a load for Yellow Strand Braided Safety Slings.

Yellow Strand Braided Safety Slings are strong, flexible, easy to attach. Special braiding methods keep safety factors high. High-quality Yellow Strand Wire Rope assures longer life.

They can be tailor-made to specifically fit your needs. Just ask your Broderick & Bascom distributor, or write direct to us for specific sling information.



Diesel switch engine is safely and easily lifted with four M-1-AB Yellow Strand Braided Slings; each sling is 8 parts $\frac{3}{4}$ " rope, 14 feet long.

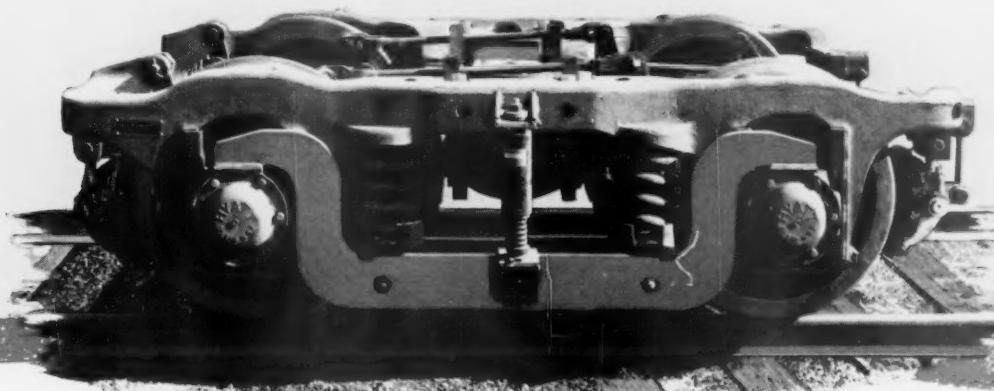
Yellow Strand[®]
Manufacturers of Wire Rope for over 80 Years

Broderick & Bascom Rope Co.
4203 Union Blvd., St. Louis 15, Mo.



American Logging Tool Corporation is a subsidiary of Broderick & Bascom Rope Co.

Repeat Orders Prove Their Value!



**The Railway Express Agency orders
Second Lot of 500 Express-Refrigerator Cars
with Commonwealth BX Type Trucks**

Because of the performance of a previous lot of 500 cars equipped with Commonwealth BX Trucks the Railway Express Agency recently placed a repeat order. Here is *true proof* of satisfactory service.

Equalization, swing motion, coil springs and friction snubbers combine to provide smoother, safer riding of loaded or light cars, protecting car contents and minimizing damage claims. Rigid one-piece cast steel truck frames with integral cross trans-

soms and pedestals insure axles and bearings being in tram at all times. As the truck frame is spring supported, unsprung weight is less than with other types of trucks, reducing impact on rails, crossings and bridges. Wear of brake shoes and brake rigging is at a minimum.

Commonwealth BX Type Trucks are approved for all types of express-refrigerator, box-express and merchandise cars operating in all classes of passenger trains. They are your assurance of dependability.



Cars built by General American
Transportation Corporation



GENERAL STEEL CASTINGS

GRANITE CITY, ILL. • EDDYSTONE, PA. • AVONMORE, PA.



To speed the cleaning operation of DIESEL PARTS put F.O.-102 to work in your maintenance departments. This highly effective cleaner has been thoroughly tested to assure top performance. . . . When used in the prescribed manner it will save hours of hand labor and add to the life of pistons, piston rings, fuel pumps, carburetors and engine assemblies.

F.O.-102 INCORPORATES ALL THE ESSENTIALS SOUGHT IN A CARBON REMOVER

- High Flash Point
- Low Toxicity
- Non-corrosive to metal surfaces
- May also be used as a cold dip
- Meets the requirements of AF-20043A

For Cold Dip—Use fast acting

F.O.-185

(non-inflammable — low toxicity)

TRY FINE ORGANICS' other well known accepted products:

F.O.-128 and F.O.-101—Safe-tee Solvents
F.O.-106 and F.O.-116—Emulsion Cleaners

Our representative will be glad to call upon request.
Write to Dept. 3



FINE ORGANICS, Inc.

211 East 19th St. - New York 3 N.Y.

EQUIPMENT

(Continued from page 82)

ments of Class H silicone materials and having extremely good solvent resistance is now available. It is made of flexible straight-weave continuous-filament glass fabric, coated with a modified-silicone resin and bears the designation T-9278.

Dielectric strength of the material as measured by the short-time, $\frac{1}{4}$ -in.-diameter electrode method is 1,250 volts per mil at 1,000 hours, 200 deg C. Solvent resistance after 48 hours in both toluene and alcohol is good and after 48 hours immersion in 100 deg C oil, no evidence of disintegration is observed. The new insulation is said to have a 10-yr life at 177 deg C, based on extrapolated data.

The material weighs approximately $\frac{1}{2}$ lb per sq yard, is 0.007 in. thick, and has a tensile strength of 164 lb per in. width. Westinghouse Electric Corporation, Micarta Div., Dept. RLC, Trafford, Pa.

any of the components of the measuring system.

Also incorporated in the new switch is an arrangement permitting the temperature and pressure set points to be adjusted in the field.

The pressure mechanism can be started and stopped manually by an external knob. The pressure system will automatically move from "start" position to "run" position when the oil reaches its operating pressure.

Although designed primarily for diesel engines, the manufacturers say the switch system can be applied to measure any liquid or non-combustible gas that will not damage the copper temperature bulb or stainless steel pressure diaphragm.

Minneapolis-Honeywell Regulator Co., Industrial Division, Dept. RLC, Wayne & Windrim aves., Philadelphia.



Diesel Safety Switch

A new type of temperature-and-pressure-sensitive switch for diesel engines has been designed to stop or idle the engine, or set off an alarm. The switch is said to respond to abnormal temperatures (up to 250 F) or pressures (up to 70 psi) where overheated engines could result in internal damage.

There are two separate systems in the switch, one for temperature measurement, one for pressure measurement. Both are mounted on a common frame and enclosed in a compact metal case.

The temperature system is a remote bulb, capillary and diaphragm assembly that measures engine coolant temperature. The pressure system measures engine lubricating oil. As the temperature rises or the pressure drops to danger levels, small, precision micro-switches on each system trip off the final engine control element or the alarm circuit.

A special "fail-safe" feature is built into the temperature system that will idle or stop the engine if damage occurs to



Over the Floor Wiring

Called Electriduct, the over-the-floor electrical extension cord shown allows electrical outlets to be placed out in the middle of the room without running conduit under the floor. Made of rubber, it is unobtrusive and eliminates messy tangled cords. Equipment on casters may be rolled over it easily. One end is plugged into a wall outlet and the other end has a two-way receptacle. The duct is $2\frac{1}{4}$ in. wide at the base which rises from a feather edge to an apex of $7\frac{1}{2}$ in. Ribs on the under side prevent slipping on the floor and the enclosed wiring is safe from moisture. The complete duct system ready to plug into a wall outlet, is available in standard 4, 5, 6 and 10-ft lengths. Ideas, Inc., Dept. RLC, Laramie, Wyo.

A-C Power Supply

A self-contained 3-kw, a-c power supply for mobile lighting and heating requirements is now available. Consisting of an alternator, a regulator and rectifier, the power supply package may be used with lighting systems on applications such as construction vehicles, power shovels, railway maintenance-of-way equipment, etc.

Operating independently of any other source of electrical power, the power

(Continued on page 91)

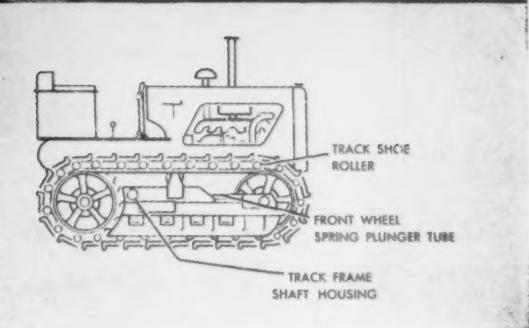


For top performance
and long service

this rugged Tractor relies on machine parts of
SHELBY SEAMLESS TUBING

In this powerful Oliver OC-12 Bulldozer, the following parts are fabricated from Shelby Seamless Mechanical Tubing — track shoe rollers, front wheel spring plunger tubes, and the track frame shaft housing. The chief qualifications possessed by these parts are high strength and superior wearability . . . qualities that are just right for a heavy-duty tractor application.

Super-rugged equipment calls for super-strong materials. That's why you'll find USS Shelby Seamless Mechanical Tubing being used for so many tractor applications. Its great strength, complete uniformity, and extreme dimensional accuracy make Shelby Seamless the ideal mechanical tubing for the fabrication of machine parts subject to bruising performance and long wear.



Available in a wide range of diameters, wall thicknesses, various shapes and steel analyses, Shelby Seamless Mechanical Tubing is produced to exacting standards by the world's largest manufacturer of tubular steel products. Contact our engineers for recommendations. They will welcome the opportunity to help you apply Shelby Seamless to your specifications.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS SHELBY SEAMLESS MECHANICAL TUBING



UNITED STATES STEEL

FOR THE FIRST TIME: A GUARANTEED SPRING FOR FREIGHT-CAR

Now . . . the freight-car truck springs you buy from ALCO are guaranteed against breakage for 10 years

Only ALCO makes this guarantee: If any ALCO freight-car truck spring purchased from now on, breaks within ten years of the date of manufacture, a new spring will be furnished by ALCO free of charge. This guarantee is prompted by the record of ALCO springs in service, and by the modern, automated ALCO facilities that assure uniform spring quality. Only with ALCO *guaranteed* springs can you be so confident of spring performance and service.

The next time you buy freight-car truck springs, specify ALCO *guaranteed* springs. The guarantee is your assurance of top quality and service in springs made by one of the nation's largest railroad suppliers. For more information about ALCO *guaranteed* springs, contact your ALCO representative.

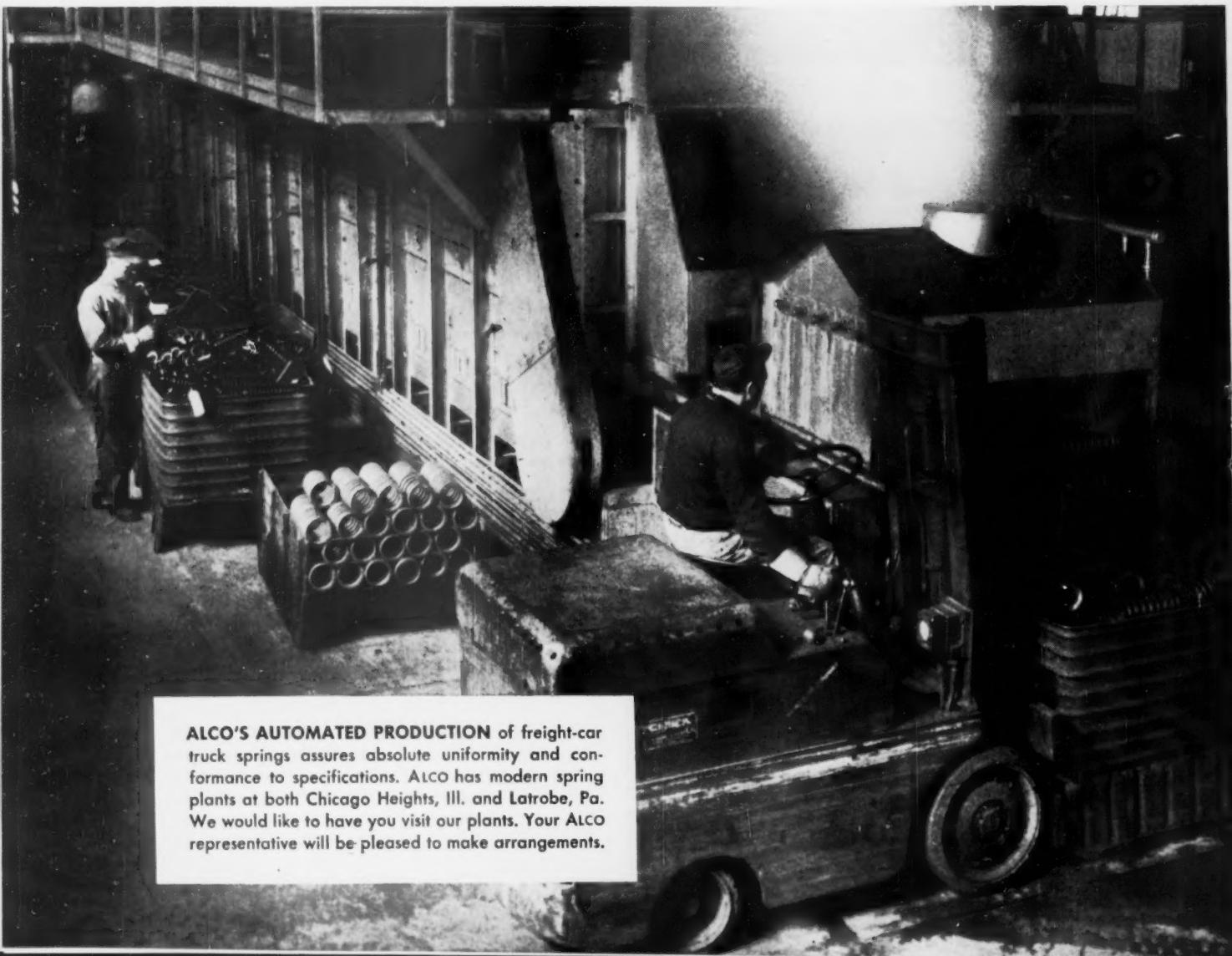
Locomotives · Diesel Engines · Nuclear Reactors · Heat Exchangers · Springs · Steel Pipe · Forgings · Weldments · Oil-Field Equipment

ALCO PRODUCTS, INC.

NEW YORK

Sales Offices in Principal Cities

ALCO'S AUTOMATED PRODUCTION of freight-car truck springs assures absolute uniformity and conformance to specifications. ALCO has modern spring plants at both Chicago Heights, Ill., and Latrobe, Pa. We would like to have you visit our plants. Your ALCO representative will be pleased to make arrangements.



TRUCKS



This ALCO guarantee
applies to these springs*:
(Standard AAR Designs)

1. 2-1/2-in. travel
2. 3-1/16-in. travel
3. 3-11/16-in. travel
4. 1915-D
5. 1936-D-2

*Except springs for
brine refrigerator cars.



FREIGHT-CAR TRUCK SPRING has ALCO date of manufacture stamped on coil. If it breaks within a period of ten years from that date, a new spring will be furnished free of charge by ALCO.

**Job-proved
to cut motor
operating
costs!**

**IDEAL
PREVENTIVE
MAINTENANCE**

**Keeps motors running like new...
The easy, fast way to restore commutators and slip rings—WITHOUT DISMANTLING!—Substitutes low-cost prevention and correction for high-cost repair and rebuilding—COSTS LITTLE, SAVES A LOT.**



RESURFACERS

Refinish commutators and rings to like-new condition even when ridged, scored or burned.



MICA UNDERCUTTERS

Stop sparking—help commutation—prolong brush life. For all sizes of commutators.



PRECISION GRINDERS

For more than surface smoothing—under machine's own power. Accurate to .001".



FLEXIBLE ABRASIVE

Cleans and furnishes commutators. Non-dusting. Complete size range.



**FREE 39-page Handbook—
Complete information on commutator maintenance.
MAIL COUPON.**

Sold through Leading Distributors
in Canada:
Irving Smith, Ltd., Montreal

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1563-E Park Avenue, Sycamore, Illinois



Send FREE HANDBOOK and information on

- | | |
|---|--|
| <input type="checkbox"/> Resurfacers | <input type="checkbox"/> Undercutters |
| <input type="checkbox"/> Precision Grinders | <input type="checkbox"/> Flexible Abrasive |

NAME _____

COMPANY _____

TITLE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

AIR DIFFUSERS. 80-page Selection Manual No. 60 on air diffusers for air-conditioning, heating and ventilating systems contains numerous diagrams, and tables to aid in the selection of diffusers and accessories for all-air high velocity as well as conventional air-conditioning systems and units. Illustrates over 90 types of round, square and straight-line diffusers. Includes also air-distribution definitions, sound level characteristics, static pressure factors, and typical installations. (Write: *Anemostat Corporation of America*, Dept. RLC, 10 East 39th st., New York.)

PORTABLE DRILL.—8-page bulletin describes the "Toggle Bug," a portable drill for drilling, reaming, or counter-sinking holes 2½ in and larger in any spot in any size shape or plate. Drills several pieces simultaneously. (Write: *Gilbert Steel Company*, Dept. RLC, P.O. Box 4342, Pittsburgh 4.)

INDUSTRIAL HOSE AND FITTINGS. 12-page Bulletin No. 182, an abbreviated version of complete line Aeroquip Industrial Catalog, lists hose, fittings, Socketless kits, and self-sealing couplings for use in the replacement field. Includes instructions for ordering, installation planning and assembly. (Write: *Aeroquip Corporation*, Dept. RLC, Jackson, Mich.)

LOCOMOTIVE PARTS SERVICE—12-page Bulletin GEA-6534 outlines nine reasons why the G-E parts service can reduce railroad maintenance cost and increase operating efficiency. Map shows five regional railroad parts centers. (Write: *General Electric Company*, Dept. RLC, Schenectady 5, N.Y.)

DRUM AND CAM SWITCHES. 8-page bulletin GEA-6307A describes features of complete line of drum and cam switches for manual and automatic control of wound-rotor, squirrel cage, d-c series, and compound-wound motors. Continuous operation requirements listed and dimensions and selection data are provided. (Write: *General Electric Company*, Dept. RLC, Schenectady 5, N.Y.)

STORAGE BATTERIES.—10-page bulletin No. GB-1078B describes the Gould Kathanode diesel locomotive starting battery. Complete engineering specifications with ampere-hour capacities, unit dimensions and approximate battery weights listed. Connecting diagrams and application for various models of diesel locomotives also given. (Write: *Gould-National Batteries, Inc.*, Dept. RLC, Trenton 7, N.J.)

SPRAY FINISH MACHINE.—12-page catalog covers four basic types of automatic transverse spray finishing machines—horizontal straight line, horizontal contour, vertical straight line and

vertical contour machines. Models and specifications of horizontal and vertical straight line types included, as well as typical uses. Contour machines in both types also described. (Write: *DeVilbiss Company*, Dept. RLC, Toledo 1.)

BEARING METAL. 4-page bulletin describes babbitt metals made by Glyco process and their advantages. Five different types in as many hardness ranges listed, together with applications for which each is suitable. Information included on how to pour Glyco metal and get perfect bearings. (Write: *Joseph T. Ryerson & Son*, Dept. RLC, 8000-A, Chicago 80.)

KATHANODE BATTERIES. 6-page bulletin No. GB-1079B describes Gould Kathanode batteries for car-lighting and air-conditioning applications. Gives full details of battery construction, including Tite-Seal posts, heavy duty diamond "Z" grids, regenerative oxide, etc., also complete engineering specifications with ampere hour capacities, unit dimensions and approximate battery weights. (Write: *Gould-National Batteries, Inc.*, Dept. RLC, Trenton 7, N.J.)

V-BELTS.—12-page bulletin, 20X6234C, contains tips on how to obtain "Longer Belt Life for Your V-Belt Drives." Describes various types of V-belts; tells how to select and match them, and lists seven steps for their correct installation. (Write: *Allis-Chalmers Manufacturing Company*, Dept. RLC, Milwaukee 1.)

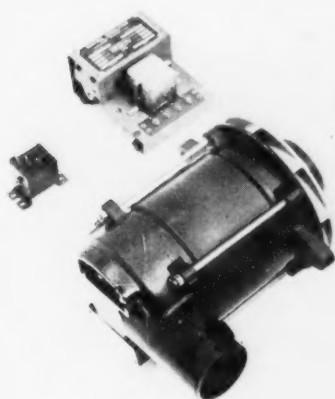
POWER SAW.—4-page brochure describes the new C-12 power saw and its economies. Chart shows cutting rates and tool costs for machining most carbon and alloy steels. (Write: *DoALL Company*, Dept. RLC, Des Plaines, Ill.)

NAILABLE STEEL FLOORING. 12-page booklet describes uses and advantages of N-S-F steel flooring for freight cars and details line of accessories, which includes N-S-F for upper-decking in box cars, doorposts for lading protection and blocking security, and grain strip. Engineering drawings show typical application details put into use on over 50,000 box cars and gondolas by 62 railroads. (Write: *Stran-Steel Corporation*, Dept. RLC, Detroit, 29.)

CUMMINS PT FUEL INJECTION SYSTEM. 12-page booklet, printed in four colors, answers such questions as how many parts are in the system; is the fuel metered in the pump or in each individual injector; does the system have to be timed to the engine, PT fuel pump assemblies as well as the PT injector illustrated in cutaways. Section also devoted to optional governor arrangements. (Write: *Cummins Engine Company*, Dept. RLC, Columbus, Ind.)

EQUIPMENT

(Continued from page 86)



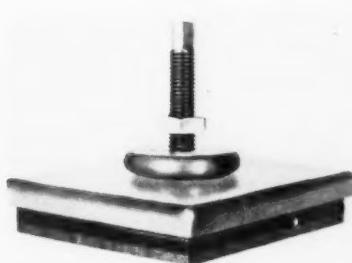
supply package may be applied wherever an accessible rotating shaft exists for a lighting, heating, or other non-frequency responsive load.

Specifically intended to be belt-coupled to a rotating shaft, the alternator has an automotive-type three-point mounting for easier installation and adjustment of belt tension. The unit can withstand rotational speeds up to 10,500 rpm. It does not require interconnection with existing electrical systems.

Pre-set at the factory, the regulator is a finger-type unit and capable of holding output voltage variation to plus or minus 3 per cent from no load to full load, and from minimum to maximum alternator speeds.

Encapsulated for moisture resistance, the Vac-u-Sel field excitation rectifier comes with brackets for ease in mounting. Rectifiers are also available for powering small power tools utilizing series universal motors.

Voltage output of the system is constant with varying frequency, single-phase a-c power. Sufficient power to light 30, 100-watt lamps is provided by the 3-kva alternator. *Specialty Motor Department, General Electric Company, Dept RLC, Schenectady, N. Y.*



Machinery Mount

Level-Rite, a self-leveling machinery mount, have been developed for mount-

A Working Guide to

LOW-COST END RESULTS



For *real* railroad cleaning economy you must have *man-hour* economy, too. So look to the speed and thoroughness with which a man cleans when using the best materials . . . and at the *methods* which can save endless hours of work.

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materials engineered for specific problems. You'll see valuable information on cleaning exteriors, interiors, running gear and trucks, parts, cooling system maintenance and many more jobs.

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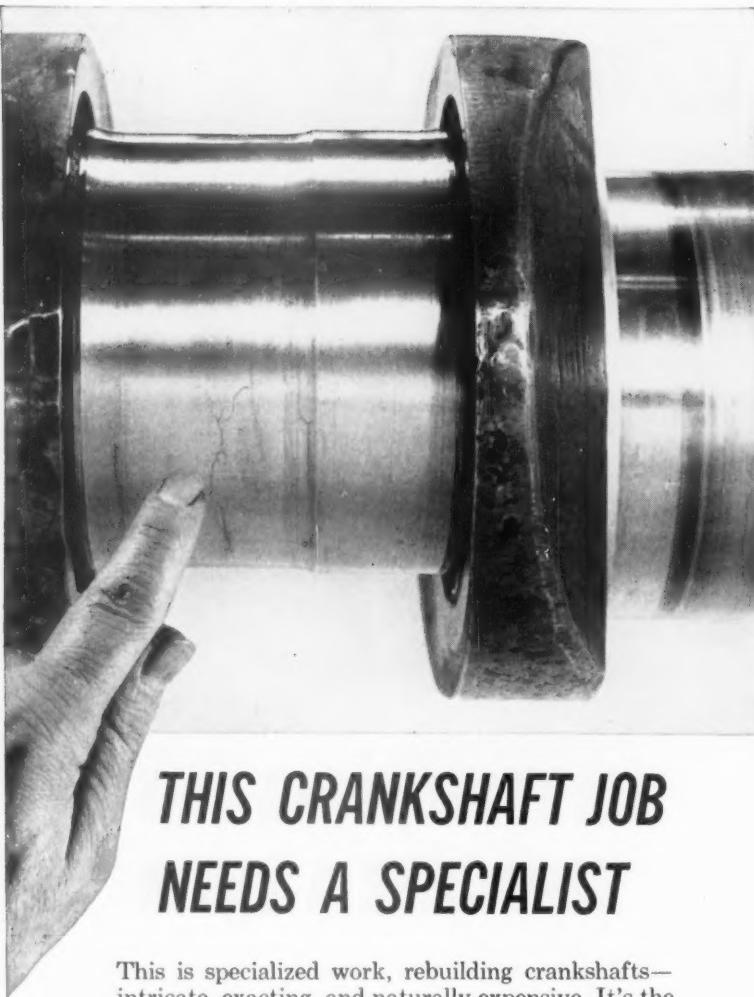


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RAILROAD DIVISION

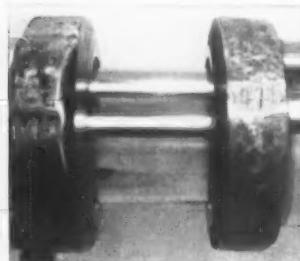


THIS CRANKSHAFT JOB NEEDS A SPECIALIST

This is specialized work, rebuilding crankshafts—intricate, exacting, and naturally expensive. It's the kind of work that demands a specialist . . . and we are just that!

We've specialized in rebuilding crankshafts, because since 1916 we've made crankshafts. And who knows better than a maker what are the "musts" of a sound, economical repair job. We'll take your worn crankshaft and rebuild it, if salvagable, through the carefully controlled steps of grit blasting, replating, regrinding and thorough inspection. And we'll deliver it back with a guarantee for 100% performance that only a manufacturer-specialist can provide. May we quote on your next job?

For more details on crankshaft repair write for Bulletin RC-1



This is a finished, repaired crankshaft, after processing by National Forge.

NATIONAL FORGE
AND ORDNANCE COMPANY

Irvine (Warren County), Pa.

ing machinery where extreme mobility and leveling ease is required. It consists of an all-steel base unit with leveling screw and plate, combined with a special Unisorb vibration-dampener pad.

There are seven models, with loading ranges from 800 to 7,500 lb per unit, in four sizes: 4 in. by 4 in., 6 in. by 6 in., 8 in. by 8 in. and 10 in. by 10 in. One unit is required for each machine leg or mounting point.

This mount, it is said, features an exclusive screw-post design to quickly and easily level a machine and new compression anchoring. Once set, machines stay level without further adjustment. No bolts, lag screws or cement are needed for anchoring, since the compression design provides positive hold, with no "walking" or creeping under side loads. Machines can be moved whenever and wherever required. According to the manufacturer, the special damper pad will reduce transmitted vibration up to 85%. It is resilient, will not deteriorate, and is impervious to cutting fluids and cleaning compounds. Felters Co., Unisorb Division, Dept. RLC, 210 South St., Boston 11.



Transporter Carries Own Charger

Operator-led electric driven industrial trucks are now available equipped with battery and charger combination units. Since the charger can be plugged into any 115-volt, 60-cycle a-c lighting circuit without disconnecting the battery truck lead connector, recharging of the battery can be done any time the truck is not in use.

Up to 23 per cent savings in initial capital investment in batteries and chargers are reported. Elimination of the necessity for a central charging point effects savings in operator travel time and in valuable space.

The transporter with battery-charger combination is well adapted to single-shift operation. If the battery is fully discharged, it can be recharged in 10 to 16 hours. No attendant is needed as the charger will automatically cut charging rate, so that indefinite charging may con-

tinute without harm to the battery. The low finishing rate reduces gassing and flushing requirements. *Automatic Transportation Company, Dept RLC, 149 W. 87th st., Chicago 20.*

Self-Powered Amplifier

A self-powered, portable public address system, known as the Lustraphone, with fully transistorized 10-watt amplifier has been made available. The unit makes possible the advantage of public address amplification wherever cost or lack of technical assistance are limiting factors. Railroads, sightseeing buses, local social, athletic and business affairs are examples of application.

The transistorized amplifier, 8-in. loudspeaker, batteries and press-to-talk microphone are housed in one complete portable case. There is nothing to hook up. The user simply flicks a switch, speaks into the microphone. Full tone and volume controls are provided together with terminals for additional speakers. *John Ould U.S.A. Ltd., 519 South 5th ave., Mount Vernon, N. Y.*

SUPPLY TRADE NOTES

(Continued from page 14)

CONTINENTAL - DIAMOND FIBRE CORPORATION.—The name of the *Continental-Diamond Fibre Division* of the *Budd Company* has been changed to the *Continental-Diamond Fibre Corporation*, a *Budd* subsidiary.

JOHN A. ROEBLING'S SONS CORPORATION.—*Douglas W. Vernon* has been appointed product sales manager for wire rope and aircord, with headquarters at Trenton, N. J.

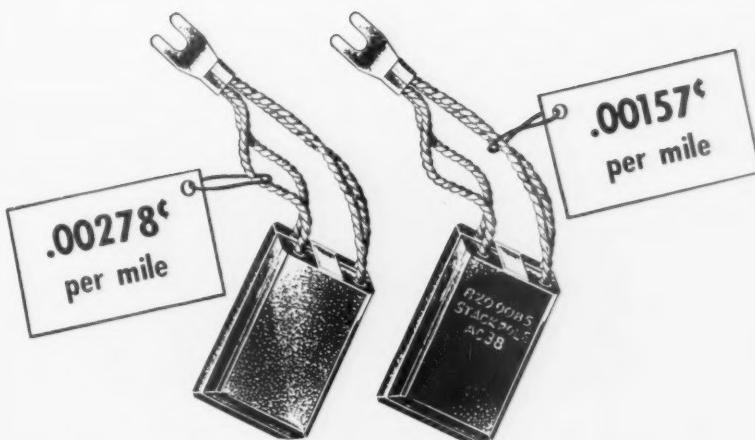
GARLOCK PACKING COMPANY.—*William E. Crowley*, Pittsburgh sales representative, has been appointed district manager at San Francisco.

JOHNS-MANVILLE SALES CORPORATION.—*Reginald L. Johnson* has been elected vice-president. Mr. Johnson becomes also sales promotion manager, succeeding *H. M. Shackelford*, retired.

EVANS PRODUCTS COMPANY.—*Evo, Inc.*, a wholly owned subsidiary of Evans Products, has changed its name to *Haskelite Manufacturing Corporation*, the assets of the Haskelite Company having been acquired by Evans Products.

ESSO STANDARD OIL COMPANY.—*Earl W. Ball*, assistant manager, railroad sales division of Esso Standard Oil Company, has been appointed manager of the division. Mr. Ball succeeds *Frederick C. Davern*, retired.

OCTAGON PROCESS, INC.—*Joe Weiser* has been appointed manager, Railroad Sales Division, with headquarters at 15 Bank street, Staten Island, N. Y.



What if brush prices included commutator reconditioning costs?

Long diesel-electric brush life is highly important. By no means, however, is it the only factor by which brush efficiency should be judged.

Let's assume that brush type A has an average life of, say, 50,000 miles. Brush type B lasts 100,000 miles. Therefore brush A requires six changes in the usual diesel reconditioning span of 300,000 miles. Meanwhile, brush B is only changed three times.

But Type A is kind to commutators! Things run smoothly the full 300,000 miles. Type B, while lasting longer, burns the commutator to the extent that an extra reconditioning is required before the 300,000 mile mark is reached.

Brushes cost about \$12 per set versus approximately \$400.00 for commutator reconditioning. Thus the result is easy to figure: *The true cost of type A brushes has been about .00157¢ per mile as compared to the 77% higher cost of .00278¢ per mile for brush type B.*

While only a rough example, such figures show why Stackpole engineering is based on the firm belief that smooth commutation is every whit as important as long brush life—and that the best brush for most uses is the one that strikes a happy medium between these two sometimes incompatible factors.



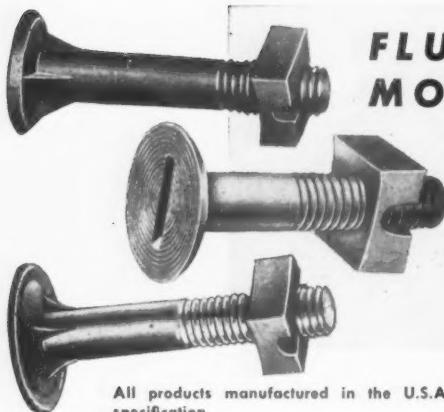
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BRUSHES

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MOISTURE
TIGHT..**

**...WITHOUT
COUNTERSINKING**

All products manufactured in the U.S.A. to A.S.T.M. specification.

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Each Lewis Sealite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

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- Nalco is proud to have the privilege of working with the "Progressive Chesapeake and Ohio Railway" toward the objective of lower operating ratios using heavy fuel oils properly treated with Nalco Fuel Oil Treatments.

In addition to initial cost savings using heavy fuel oils and Nalco Treatment, there are also these added operating advantages: greater fuel efficiency, minimized sludging problems on the locomotive, in storage and fueling facilities.

For full details on Nalco Fuel Oil Treatments to help you attain the objective of lower operating ratios, call your Nalco Representative, or write direct.

Other Nalco Products in use by the C. & O. include chemicals for control of scaling and corrosion in diesel cooling systems, diesel steam generator systems, steam locomotives and stationary boilers.

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THE *Nalco* SYSTEM • Serving Railroads
through Practical Applied Science



The taper makes TIMKEN® the only journal bearing that delivers what you expect when you buy a roller bearing

THERE are only two reasons for putting freight car journals on roller bearings: 1) To end the hot box problem, and 2) To cut operating and maintenance costs to a bare minimum. The Timken® tapered roller bearing is the only journal bearing you can depend on to do both these jobs. It's the taper. And here's why:

(1) *Positive roller alignment.* The taper in Timken bearings holds roller ends snug against the rib, where wide area contact keeps rollers properly aligned. Full line contact is maintained because rollers can't skew.

(2) *No lateral movement within the bearing.* Because of the taper, there's no lateral

movement to pump lubricant through the seal. Lubricant does not leak out of the journal box and onto the rails causing costly diesel locomotive wheel slip. Costly lubricant is saved, lubricant replacement cost cut. And because there's no lateral movement, there's no scuffing of rollers and races to shorten bearing life.

Unlike costly "crutch" devices that merely attempt to improve friction bearing performance, Timken bearings eliminate the cause of hot boxes—the friction bearing itself. And Timken bearings bring operating and maintenance costs down to rock bottom. Timken bearings cut terminal bearing inspection time 90%. They reduce lubricant cost as much as

95%. Fact is, the new Timken heavy-duty type "AP" (All Purpose) journal bearing assembly can go three years without the addition of lubricant. These are the reasons why over 21,000 freight cars now roll on Timken bearings, why more and more railroads are going "Roller Freight".

Be sure you get Timken tapered roller bearings. They're the only bearings that deliver what you expect when you buy roller bearings to end the hot box problem and cut operating and maintenance costs to a minimum. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN TAPERED ROLLER BEARINGS ROLL THE LOAD

